

How High Can It Fly?

Examining the Evidence on Information
Mapping's Method of High Performance
Communication

by
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Chapter 1



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Note

If you do not have Chapter 1 or 2, please download it from:
http://www.stanford.edu/~rhorn/a/topic/stwrng_infomap/tocStructrdWriting.html

Overview of Research Results

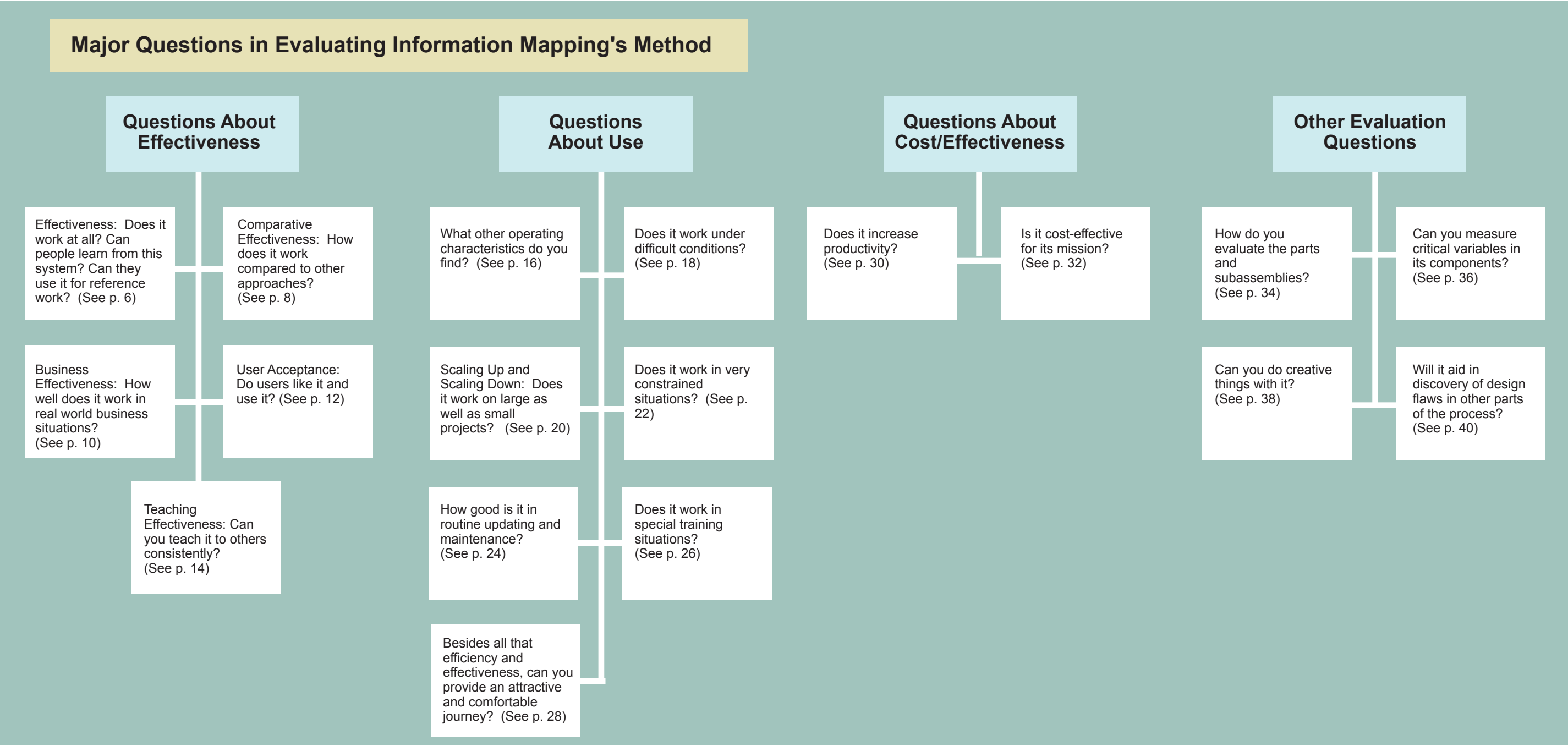
Introduction

When evaluating a methodology such as Information Mapping's method, it isn't a good idea to ask "Is it a good thing?" and expect to get a simple "yes" or "no" answer.

That is an unsophisticated view of evaluation. You wouldn't ask that of a large truck or an automobile. You would use the kind of approach used in consumer report magazines. They break down the question of "Is it a good product?" into several questions. Similarly, managers need to ask a series of questions about the methodology that Information Mapping has developed.

Basically, the approach is to first, look at the purpose(s) for which the products are used; then, establish a set of criteria by which to judge the product; and finally, develop some kind of matrix of results from which to make your final decision.

On this page, we list the questions managers should be asking about Information Mapping's method, and provide the page numbers in this chapter where the answers can be found.



Interlude-The Aircraft Evaluation Metaphor

Introduction

We can look at the question of this chapter: "How do you evaluate something like Information mapping's method?" by a parallel examination of an analogous question: "How do engineers test and evaluate a new airplane?"

Component Testing and Assembly

When engineers design an aircraft, they use the best components. They make sure that each one of the components has been tested and evaluated by its manufacturer. And they test their own quality control and assembly line methods. Similarly, when we developed Information Mapping's method, we found the best components for our method. We didn't invent all the components, nor did we do all the research and evaluation on the components. We were highly selective in our synthesis. Ant we put all of the components together to meet our high criteria of performance. For example, decision tables had been invented in the computer industry a few years before. They looked promising as a tool for analyzing and communicating decisions. After our own testing, they became one vital component of Information Mapping's method.

Using Components to Support Mission

Aircraft designers don't invent a generalized aircraft. they invent an aircraft to accomplish specific missions: one that has to fly a specific distance and carry a specific number of passengers. Then they select components to do that job.

Similarly, we didn't use everything that was available in the world of communication. For example, there are many communication techniques which are effective in advertising but which are not appropriate in other arenas of business.

We identified the best components available for the purposes of clear, consistent, and precise communication in specific kinds of documents.

Testing Performance

After an aircraft has been designed, a test pilot flies it. Can it get off the ground at all? Evaluators want to see if the components, each of which have been tested separately, perform together. How fast does it fly? Evaluators want to know how much maintenance it needs. Similarly, we tested our method in hundreds of different situations.

Testing Cost-Effectiveness

Just because engineers can build an aircraft doesn't mean that it is cost-effective. They have to do a different kind of analysis to answer the question of cost-effectiveness.

Similarly, we have compared the cost of producing documents using Information Mapping's method for various kinds of tasks, from writing memos and reports through writing large documents and training systems and research reports. And our users have found that it is extremely cost-effective.

Using Scientific Theory

It should be remembered that an important part of making an aircraft fly is aerodynamic theory-the science of flight. The Wright Brothers made a plane fly without the benefit of very much aerodynamic theory. Therefore, their first aircraft did not fly very far and did not go very fast. In fact, it flew for twelve seconds the first flight. It flew three more times that year and then was destroyed in a crash.

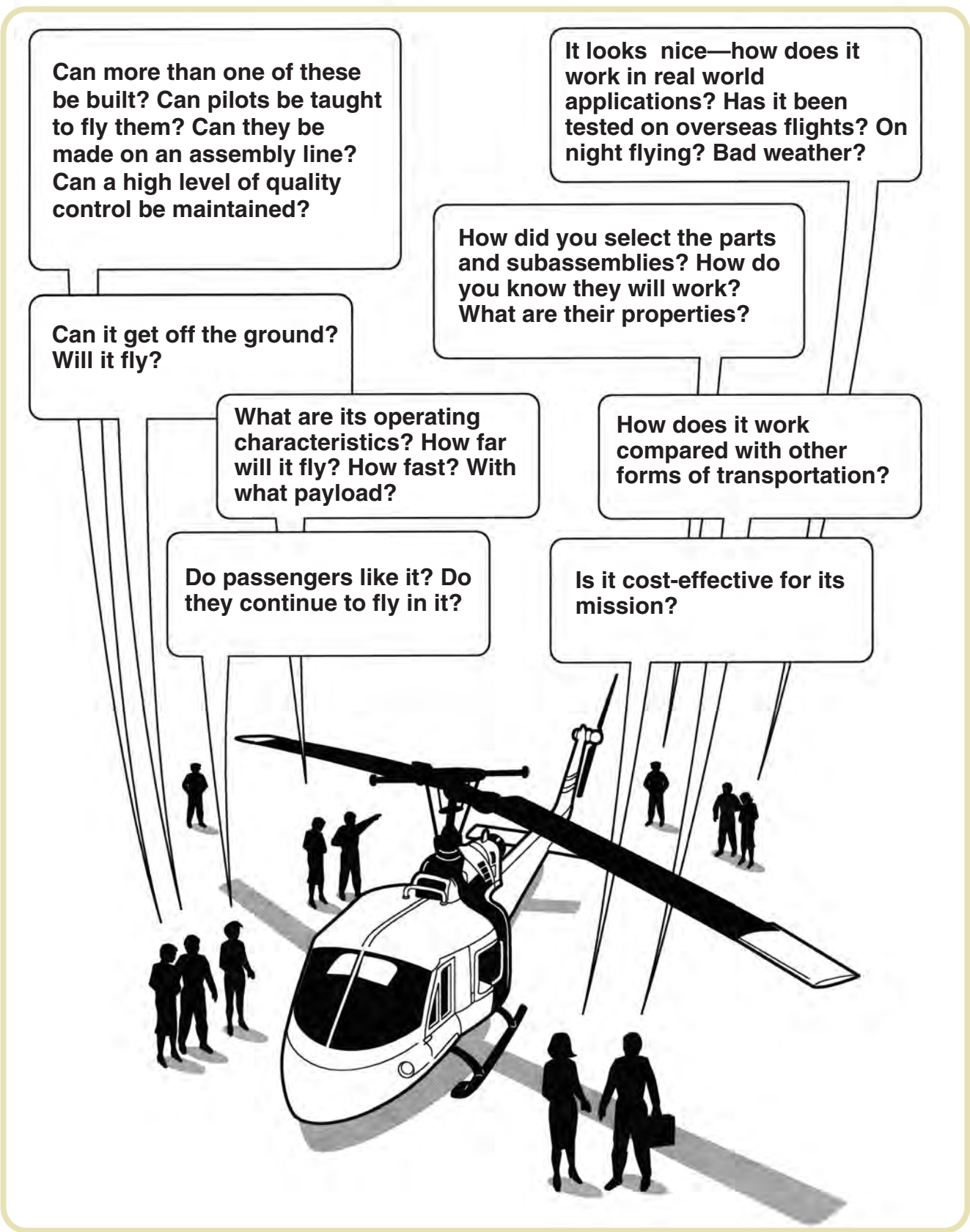
Early in our development of documentation engineering (before we had the theory to guide our design efforts), we too had a few crashes and produced documents that couldn't get very far off the runway. But, over the years, improvements in Information Mapping's method have made major contributions to the theory of modern training documentation, enabling us to have consistently high performance communication.

Comment

So, in many ways, we have looked at the evaluation of Information Mapping's method in the tough-minded way an aircraft engineer judges an aircraft. We will look at many of these questions in the coming pages and see how analogous questions can be asked of Information Mapping's method.

Note on the Engineering Metaphor

We use the method in this chapter to emphasize the seriousness with which we approach the issues of communication. We are serious when we ask, "If your documentation writers built an aircraft, would you fly in it?" We believe that the subject of documentation can and should be "engineered" with all the precision and professionalism of aircraft engineering.



Effectiveness: Does it Work?

A Course at Harvard

Only a couple of years after I had first formulated the ideas for Information Mapping's method, Harvard University's Graduate School of Education asked me to teach their course, Research in Instruction. Dr. Douglas Porter, who usually taught the course, encouraged me to teach Information Mapping's method to the class as it applied to developing instructional materials.

Initial Question: To What Can It Be Applied?

I was eager to teach the course on Information Mapping's method because it would begin to answer the question: "Does it work at all?" One aspect of analyzing the effectiveness of the course was: "Can it be applied to a wide variety of subject matters, or only to a limited few?"

At that time, I had tried the method on about a hundred pages of computer software documentation, and had written a few pages on several other subject matters. Because of the way the methodology was put together, I was fairly confident that it would work with many subject matters. But I didn't know just how widespread its applicability would be.

15 Different Academic Subject Matters

Teaching the Harvard class gave me a chance to talk with people from varying academic backgrounds. The range of their specialties was wonderful. There was an art teacher, a statistician, several social scientists, several people from the sciences (biology and physics), a recent graduate from the Harvard Dental School who planned a career in dental education, and a mathematician. "This will provide a very good test," I thought, "as to whether or not you can apply the method to a lot of different subject matters."

All Areas and Grade Levels Successful

Shortly after I asked the students to write a paper using our method in their own individual subject matters, there was a great deal of excitement, and it became clear that their projects were working. I had successfully taught Information Mapping's method to a group of people for the first time. The students were turning out instructional material using the method, and their students, colleagues, and friends liked using it. The method had passed the first hurdle.

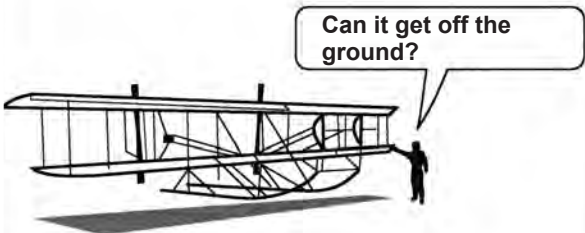
Now, Almost All Business Subjects Tested

The same question, "How many subject matters will the method apply to?" has now been more than adequately answered.

It has been applied to literally thousands of different training and documentation situations in industry: clerical, professional, technical, and managerial. It has been applied to computers and it has been applied to assembly lines. Information Mapping's method can be applied to an extremely wide variety of situations successfully.

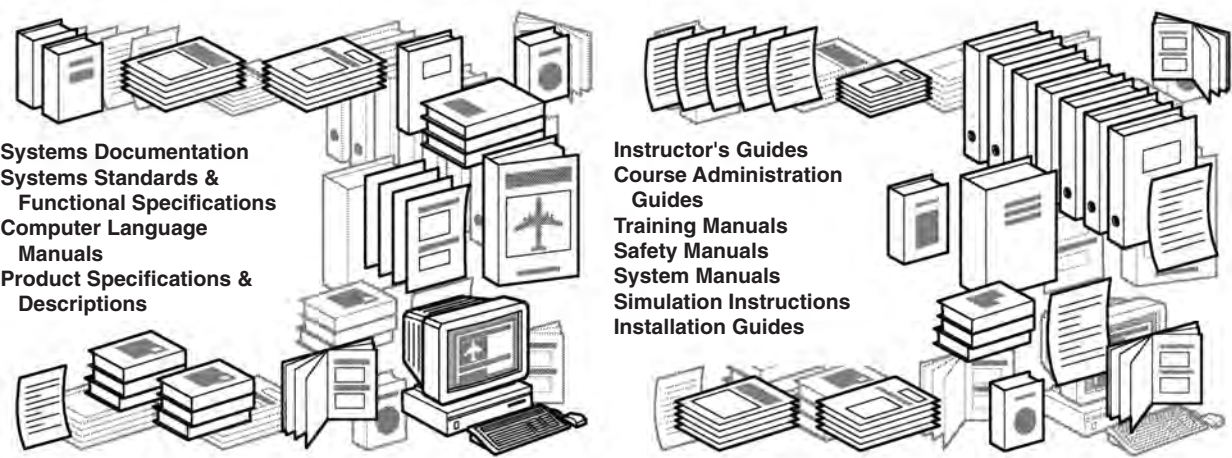
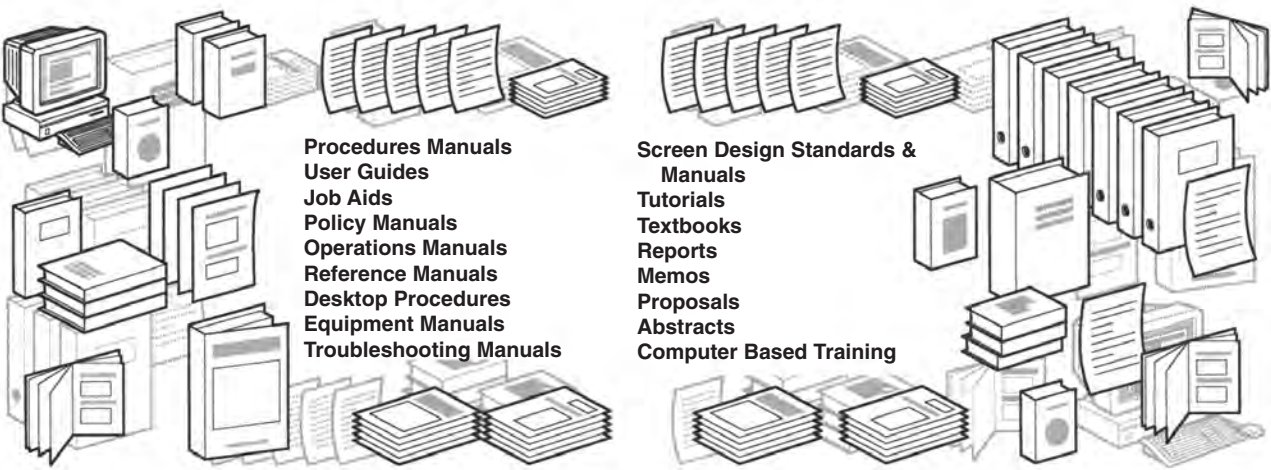
Analogy to Aircraft Evaluation

Their "does it work" question is analogous to the Wright Brothers' question:



Information Mapping's method "gets off the ground" with every major document type in business, science, and technology.

Select Document Types for Which Information Mapping's Method Has Been Used



Comparative Effectiveness: How Does It Work Compared With Other Approaches?

Introduction

When we started working on Information Mapping's method, we surveyed the research on improving human communication and incorporated the best of that research into our design. But, after we'd put it all together, the question remained: "How does it work compared to other approaches?"

Fifteen Dissertations

Over the past 15 years, 15 major dissertations have been completed on Information Mapping's method, several master's theses have also been completed, and more research is in progress. These projects have been done in four different countries: the United Kingdom, Canada, the Philippines, and the United States.

User Populations

The studies involved a variety of different students, from high school to university and college students, adult learners, and clerical workers.

Compare Prose or Programmed Instruction

Eight of the studies compared Information Mapping's method with some other method. The most common was to compare it with conventional prose text. Some of the early studies compared Information Mapping's approach with material that contained short chunks of text with many carefully sequenced questions called programmed instruction.

Compare Learning and Retrieval

Some of the research studies compared two treatments from the standpoint of learning (measuring errors and time to learn) while other studies compared the ability of people to retrieve information from a document in job-like circumstances. Retrieval tests were done because much of the learning that goes on in the business and industrial environment is related to on-the-spot performance, which requires the learner to go to a shelf of manuals, texts, or training materials and look up what they have forgotten or perhaps what they have never learned in the first place.

It has been estimated that more than half of the learning that takes place in business and industry is of this reference-based type.

Summary Conclusions

The comparative studies showed that Information Mapping's method was significantly superior to the more conventional methods. In Chapter 2, we summarize each of these studies. Here are some highlights.

Effective with Low Ability Adult Learners

Michael Stelnicki of Northern Illinois University found that the text written with Information Mapping's method was more effective for learning facts and concepts than standard text materials. Stelnicki did his study on subjects who were in the "low general ability category."

Retrieval is Better

David Jonassen, of the University of North Carolina at Greensboro, and Lawrence Falk reported that the structural characteristics of Information Mapping's method provide a clear advantage for retrieving information from textual materials. Jonassen and Falk's study compared the retrievability of information developed according to the Information Mapping standards with that of training materials with strong characteristics of programmed instruction.

Many other studies of human memory show that learners forget up to 80% of what they learn within two to four weeks. That means that all of us must go back to the textbooks that we used in class to look up what we need to know when we have to use it on the job. And this is where the superiority of Information Mapping's method for retrieval is most important.

Children and Adults Learn Mathematics Faster and Better

Alexander Romiszowski of the Loughborough University of Technology in England compared Information Mapping with traditional textbooks in a mathematics course. Subjects were 15- and 16-year-old advanced secondary students and 20- to 30-year-old adults who were attempting to complete high school. Romiszowski reported that Information Mapping's method enabled students to learn significantly more mathematics in less time than students using traditional textbooks with comparable subject matter.

Significantly Higher Achievement in Initial Learning

Thomas J. Soyster of Temple University compared the use of the Information Mapping materials with ninth-grade vocational education and science students. He found that students who used Information Mapping's method scored significantly higher than those who used programmed instruction materials when tested immediately after the training.

Analogy with Aircraft Evaluation

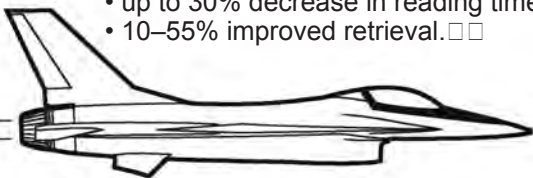
The question asked by aircraft engineers is:

How fast does it fly compared with other aircraft?

"The questions" asked in Information Mapping research is analogous to "the question" asked by aircraft engineers: How much better learning or how much better retrieval can you get compared with other approaches?

Here is how aircraft engineers might make performance comparisons:

- Comparative Operating Speeds
- Large Passenger Airliner — 650 mph
 - Fighter Aircraft — 1,650 mph
 - Apollo 10 Command Module — 4,792 mph



- Information Mapping's superiority:
- 10–50% improved learning
 - up to 30% decrease in reading time
 - 10–55% improved retrieval.

Business Effectiveness: How Well Does it Work in Real World Business Situations?

Business Results Better Than Academic Results

How do the academic results reported on the previous page transfer to business situations? Do business evaluators find similar results in their real-life training situations? The answer has been surprising. Frequently, the results are even better!

One of the earliest reports of a major evaluation was done at Pacific Bell. They compared Information Mapping's method with their standard training procedure.

Improves Initial Learning by 50% and Reduces Training Time by One-Half

Naomi Webber of Pacific Bell has reported on an evaluation of a two-and-one-half day course for clerical people on accounting coding tasks. Her report, presented at the convention of the National Society for Performance and Instruction, indicated that learners using materials written in Information Mapping's method scored almost twice as well on the criterion test as did the control group. The Information Mapping learners took an average of one day for the self-paced learning mode as compared with two days for the control students. Ninety-five percent of the Information Mapping learners felt "fairly well" to "well prepared and confident" at the end of training, as compared with 44% of the control group.

Webber reported, "The performance level back on the job has been good. We've seen them start out making 85% accuracy, and within a month they're moving up into the 90s in on-the-job performance."

Industrial Strength Test under Real World Conditions

Academic studies, while very important, are often conducted with training materials that take about an hour to learn and have relatively few pages. People in ordinary business situations, however, have to process gigantic amounts of information. Eric Shaffer used a large 185-page manual prepared by Information Mapping, Inc., for his research. Clerks had to use this manual to look up and understand complex information in order to fill out forms. He compared the effectiveness of this version with the standard 140-page manual that was in ordinary use in the company (unfortunately, the name of the large telecommunications company which sponsored this research must be withheld because of non-disclosure requirements). Shaffer said in his report that Information Mapping's version had "few errors in content and an exceptionally clear writing style." Informally, we were told that a special task force had considered it to be one of the best manuals ever produced by the company.

Shaffer's test subjects were employees of the company who were going to use this manual on the job, not students as in academic studies.

Results of Performance Study

When using the Information Mapping version of the manual, the subjects committed almost 55% fewer errors than with the standard version. So, when up against the best manual produced in the company, Information Mapping came out far ahead.

Licensing the Method

Shortly after these and other evaluations were done, Pacific Bell became the first major company to obtain a license to teach Information Mapping's method. Since then, many other companies in the Fortune 500 have licensed the teaching of the method for their employees.

Importance: Much Office Work Is Error Correction

The importance of these studies should not be underestimated. Marvin Sherman, a Cambridge, MA-based office procedures and office automation specialist, reported that 50 to 60% of the work done in an average data processing office is the correction of errors; in fact, a great many of these errors are due to improper training and procedures.

Analogy with Aircraft Evaluation

The question asked by aeronautical engineers is:

How well does the aircraft perform compared with other business aircraft?

The question asked of the Information Mapping approach is similar: "How does it work compared with other approaches?"

Business report 10 to 50% more rapid writing of technical documents.



Conventional Business Approaches

Information Mapping's Approach

User Acceptance: Do Users Like It and Use It?

Important Question: Do People Like It? □

Do people like Information Mapping's method well enough to use it regularly? The answer to this question is that Information Mapping's method has been receiving recognition and acceptance from the time of its first experiment to the present.

Test In Statistics Class □

Early in our research, we directly tested this vital question of usage with some students in statistics at the Harvard Graduate School of Education. We wanted to find out if there was simple acquiescence to using the method, or if we had something that people really wanted. We figured that if a busy student would make a special trip and walk a few blocks to get the material for review, it would say something very positive about their acceptance of the method.

We had done the usual control group learning experiment, giving half of the class a straight prose version, the other half Information Mapping's version. The students spent an average of 10 hours with the different versions and took open book midterm exams. At the end of the test, we collected all of the learning materials that they had been using. Then they went back to using their regular textbooks for the rest of the course.

Learners Can Have Own Copies If They Walk to Our Office □

We announced after we picked up the books that anyone who wanted a personal copy of the textbook materials used in the evaluation could come over to our office and get their own copy.

We wanted to count the number of people who would take time out from their busy academic schedule to get a copy of something they had already learned from and had already taken the preliminary test on. We felt it would tell us they liked it well enough to walk six blocks out of their way.

When they came to the office, we offered them a choice of the two different versions--the prose version or Information Mapping's method version. It was the first time they had a chance to examine both versions.

Most Chose Information Mapping's Method □

Thirteen students walked the six blocks. After inspecting the two versions, 12 of the 13 students selected Information Mapping's version. This type of evidence for preference is particularly strong because it relies on behavior rather than verbal reports.

Pacific Bell's Pilot Study □

Pacific Bell in San Francisco was one of the earliest companies to license the Information Mapping methodology. Before committing the company to a long-term license, Pacific Bell decided they would do a pilot study first. Because they wanted to avoid "shoving it down anybody's throat," they had a couple of trial courses, and then sent out an announcement of the courses with their regular course bulletin. □ □

Overenrolled Each Time □

At the time this study was conducted, the managers could choose which courses their employees needed. Clearly they couldn't buy every course they needed: the time wasn't available and the training budgets were limited. The managers' response at Pacific Bell was, however, to overenroll the course by twice the available seats! This meant that managers were willing to pay out of their own training budgets to have their people trained in Information Mapping's method. Several thousand people have now taken the course at Pacific Bell and the course was frequently oversubscribed for many months. This experience proved that Information Mapping's method satisfies very tough criteria: "Do they want to use it when they don't have to?" And "Will they pay for it out of their own budgets?" The answer to these questions appeared to be a resounding "yes."

Analogy with Aircraft Evaluation

Do passengers like flying in it? Do they continue to buy tickets?

The questions here are, "Do readers and writers like it and continue to use it? Do people prefer using Information Mapping to other systems? Do you have repeat business? Do customers want to license the technology?" They are similar to the market research questions in the airline industry.

Information Mapping's customers have grown each year and averaged 10,000 seminar attendees the last few years, many as a result of referral and most from organizations who had been clients before.

Many large organization have licensed the teaching of the method so as to teach hundreds of employees a year more economically.



Teaching Effectiveness: Can You Teach It to Others Consistently?

Important Question: "Can You Teach It?"

One of the important questions that we need to face in having a successful writing methodology is, "Can we teach writers?" Here are some of the most important questions we need to ask in order to determine whether the writing methodology is successful:

- Can we teach writing with some assurance that writers can or will follow standards?
- Would two or more of our trained writers deal with the same subject matter in a similar fashion?
- What implications does use of the method have for the management of large writing teams?

Our investigations into these questions have produced very encouraging results.

The Research Protocol

We teach dozens of courses a month in writing procedures and instructional manuals. In each of those classes, we have given a standard exercise to every participant at the end of the course. We expect that they will create seven maps, all of the right type, select and write the correct blocks, and that all will have a similar organization and sequence to the chapter that they have written. A description of this evaluation follows.

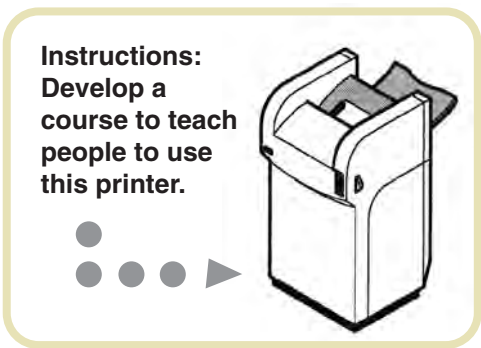
Time and Groups

The learners spend approximately four to eight hours on this exercise. They typically work in groups of two or three, although some individuals work alone.



Input

The learners are given dialogue and drawings about how to run a piece of equipment (in this experiment, a printer from a data processing system). They are asked to develop a short project of documentation on the subject based on the information provided.



Outcomes

Our instructors thoroughly examined the results of this test in every class, and we found approximately 80% or better similarity in all the maps and blocks in every class.

If we did a formal evaluation, of course, we would scramble the pages, and ask independent judges to determine who wrote which page. The judges, we are confident, would be unable to tell who wrote which pages; they are so similar.

Moreover, the judges would find that 80% or more of the different treatments were functionally identical (with minor variations in wording).

Conclusion

These are impressive results. They mean that properly trained instructors can reliably teach people to write in Information Mapping's method. And we have been doing it in our classes with certified instructors since the late 70s.

Basically, this ongoing quality control process means:

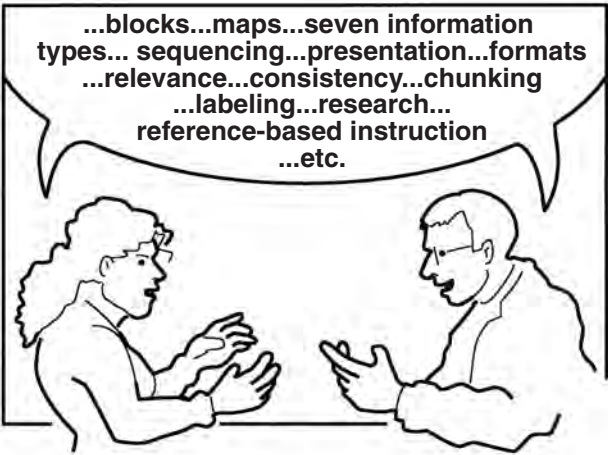
- the method can be taught
- it can be taught to be effectively used immediately
- the way it is implemented by wide variety of people is remarkably similar.

This does not mean, however, that you cannot employ your creativity when using Information Mapping's method.

Writers Have Common Language About Writing

One of the most exciting aspects of Information Mapping's method is that we have developed a common language writers can use to talk with each other about their craft. It is now possible for writers halfway around the world to contribute chapters or pages to a common project and have the outcome of their diverse contributions be easily combined into a common product.

Before, when one writer talked to another and said, "Well, you need a paragraph here," there was no predicting what you might get. Different writers would write many different things. This, however, is not the case with Information Mapping's methods with which writers tend to approach the same subjects with a highly reliable similarity. For obvious reasons, this similarity is a great advantage when dealing with business documents.



Two Courses Written-Unable to Tell Who Wrote Which

This remarkable similarity of documents produced with Information Mapping's method was proven to me when I taught a course in England which Alexander Romiszowski, the well-known British instructional designer, attended. After the course (though neither of us was aware of it) Romiszowski and I were simultaneously developing courses on matrix algebra.

A year later, he sent me a copy of his course, and I recognized immediately that we had conducted an extraordinary experiment. We had each used the same method to approach the same subject matter completely independently of each other. In the language of research design, we were perfect controls for each other. We were the perfect blind experiment!

Results

The results were beyond my greatest expectations. We found a remarkable similarity in:

- choice of subject matter,
- division of the subject matter into maps and blocks, and
- treatment of various blocks.

If we had wanted to do a formal evaluation, we could have scrambled the pages that each of us had written and challenged a judge to determine who wrote which page. In such a case, it would have been nearly impossible to tell which version the pages had come from. This case illustrates the remarkable ability of Information Mapping's method to achieve one aspect of high quality control standards: substantially similar courses.

Analogy with Aircraft Engineering

The aeronautical engineering questions are:

- Can you build more than one of these?
- Can you teach pilots to fly them?
- Can these be made on an assembly line?
- Can you maintain a high level of quality control?

The documentation questions in quality control are:

- Can the method be taught?
- How easily can a group of documentation engineers and technicians work as a team on documents?
- How do you maintain quality control?

The results of weekly quality control tests are resoundingly positive.



What Other Operating Characteristics Do You Find?

Test Pilot Takes the Method Out for a Test Flight

One of our test pilots was Sarah Bixler of Lincoln National Life Insurance Co. She presided over the installation of Information Mapping's method for writing reports, proposals, and memos in a whole department. At a National Society for Performance and Instruction meeting the following year, she reported on her experiences, and provided some valuable insights into the operating characteristics of Information Mapping's method. We quote some parts of her report on these pages to give you a taste of the unexpected benefits that managers receive from the method.

Increased Project Control

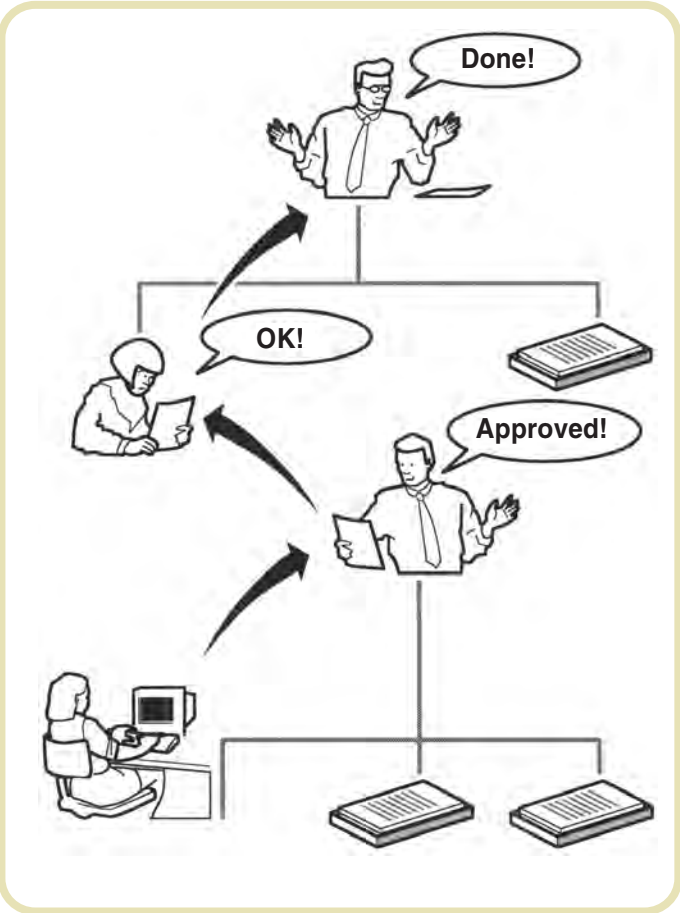
"I'm a project manager and I'm supposed to have a lot of autonomy when I do my job. But there are always those points when you have to get some kind of an endorsement from somebody above you. And I found that when I went for those endorsements, the people were playing around with my projects, and I was losing control. I couldn't really determine why that was happening, but I knew I had a problem. When I went through Information Mapping in report and memo writing and started using the decision memo that's outlined in that course, I found that I stopped having the problem because I was asking very open-ended questions when I was getting my endorsements instead of saying, 'Here's the problem, here are the alternatives, here's my recommendation, what's your decision?'"

More In-depth Thinking

"I think when you first approach Information Mapping, you think of it as a way of writing. Then, after you've worked with it for a while, you think of it as a way of thinking. And so, the second benefit is that we find it actually facilitates more in-depth thinking about the subject matter itself. Then, after someone has written a memo in Information Mapping, they're very likely to say, 'You know, I hadn't really thought this much about that subject beforehand,' or, 'I really came to some good ideas that hadn't occurred to me before,' or, 'I really thought about a facet of the problem that I hadn't been able to think about before.' So it's actually facilitating in-depth thinking about the subject they're writing about."

Faster Response Time

"A third benefit that we didn't expect is a faster response time. I'm sure that a lot of you are in organizations where, if you're having a problem, it seems like it takes forever for anybody to even get to the problem to help you. I was working on an interdepartmental project. The department that I was working with promised to have it for me by a certain date and then they told me that they weren't going to be able to meet their deadline. Well, I had already committed to that project, and I was very concerned about it. I put together an Information Mapped memo about the problem that I was having and asked for assistance. I left it on my supervisor's desk before I went home one evening, and the next morning when I got to work, it had already gone up three levels of management and was ready to go to the head of the other department. I've never had that kind of response time for any problem I've had before."



Better Utilization of Clerical Staff

"The fourth benefit is to our clerical staff. I have found that our clerical staff has really responded very positively. I think that we were underutilizing them. We weren't giving them enough responsibility for drafting letters and memos themselves. I don't know if that's a common problem with other people in other companies, but I felt that we needed to give them more responsibility.

"They were a little bit shy about taking that responsibility, but after going through the workshop right along with the other managers and staff people, they have really done some super things. They have been drafting their own letters for the first time, and they're very proud of them.

"One person who is responsible for coordinating our home office schools has a whole series of memos she sends out beforehand that have been traditionally written by a staff person. They have traditionally been very hard to read, so she's taken that whole series and rewritten all of them on her own, and they are terrific. She's done a really good job with it. So they've seen it as a way of actually increasing the kind of responsibility that they're dealing with. And I think they were very excited about being included."



Better Meetings Because of Better Pre-Meeting Report Preparation

"The fifth benefit that we didn't expect is the way an Information Mapped memo or report can actually help a task force or committee stay on track. My supervisor is involved in a task force for developing a feedback system for our work effectiveness program. He needed to put together a report that would identify the problem and name some different recommendations and possible solutions. He did the report in Information Mapping.

"He spent quite a bit of time thinking about the subject. In fact, he said he may have spent longer than he would have writing a memo in the traditional manner. When the other members of the task force got it, though, they went through it, asked a couple of questions, turned to his recommendation page, and were able to use it as an agenda.

"They anticipate that it may have reduced the time that they had to spend together as a committee and task force by at least 10 hours. That more than offset the extra time that he put into preparing the memo because of the thought he gave before going to that task force." □ □ □

Analogy with Aircraft Engineering

What does the test pilot say?



After engineers have designed an aircraft, they have a test pilot fly it to see how well it performs its intended function. They want to see how fast it flies. They want to see if the components, which have each been tested separately, fit together properly. And often, they want their test pilot to observe and report on operating characteristics that might not be easily subject to precise empirical investigation or testing in their wind tunnels. □

Does It Work under Difficult Conditions?

Introduction

The real world of business has many situations that don't fit into neat academic research categories, and there are many rough edges which academic research tends to smooth out in order to control all the variables. For this reason, it is often much more difficult to do research in the world of business than in the controlled conditions of an experiment.

The Questions To Be Asked

In the world of business, we address our methods and materials, asking, How well do they work:

- in actual training situations?
- presented on-line on computer screens?
- when there are thousands of pages of documentation or training materials?
- with those who have poor English reading skills, or who only speak English as a second language? with hotshot experts? For supermanagers?

Information Mapping's method has been tried in literally thousands of business situations. The chart on the facing page lists some of the many types of tough situations for which the method has been used and found to be robust and successful.

Large Application Situations

One of the largest real world situations (we happen to know about it because we did it) involved the documentation of over 3,000 pages. Using Information Mapping's Method, the documentation was done by a team of 5 people in 8 months, with only one and one-half drafts. The material was then successfully used in the implementation of the largest computer system ever installed by one of the top petrochemical firms in the world.

Analogy with Aircraft Evaluation

In our continuing analogy to aircraft engineering evaluation, we would compare the questions we are asking on this page to the aeronautical engineering questions:

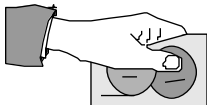
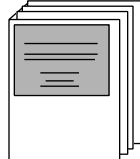
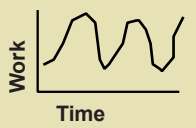
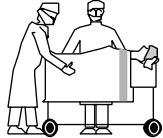
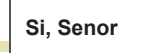
- How does it work in real world situations?

- Has it been tested on overseas flights?
- What about night flying?
- What about flying in bad weather?

Information Mapping has been tested in many very difficult situations. See chart on facing page.



A Sampling of Difficult Real-World Situations

Context	Requirement	Unusual or Difficult Circumstances
Gigantic projects Impossible deadlines	Write approximately 3,000 pages of documentation and training	 - new computer installation - 1,000 people to be trained over a 3-month period
Instructor not present	Train retail clerks to run credit checks	 - personnel must train themselves because there are stores in many different locations
On-line database of drug evaluation information	Design database for information system	 - information must be easily accessible to physicians and health personnel - must be easy to update weekly
Impossible deadlines	Document personnel policies (over 1,000 pages)	  - five months to write entire manual using 40 subject matter experts and team of 5 writers
Procedures for clerical personnel	Document back office business procedures for large financial institutions	  - high turnover of personnel - large backlog of work - many peaks and valleys of work flow
Hospital administration	Train busy hospital personnel to run new computer	 - little time for training - much self-instruction required
Experts as Learners	Write computer manuals for programmers in a computer company	 - users think they already know everything about the subject
Physicians as learners	Design medical reference system	 - physicians reluctant to touch keyboards - too busy to learn system
Chemical plant safety	Train chemical plant employees (at all levels)	  - safety is critical to the operation of plants when highly toxic or explosive materials are used
Non-fluency in English	Train clerks in a retail store environment	 - English is a second language for trainees

Scaling Up and Scaling Down: Does It Work on Large as well as Small Projects?

Introduction

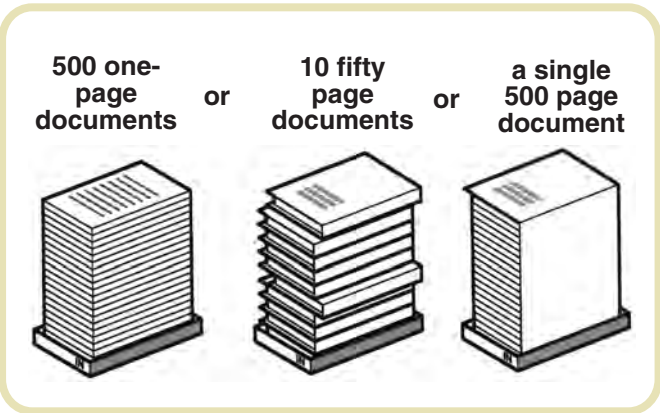
□ When you have a systematic approach to tasks, it is always good to ask: "On what scale does it operate?" and "What are the limits of its applicability?" Information Mapping's method has performed well with both very small and very large documents.

Smaller Writing Projects

□ Information Mapping's method has proven to be very useful in smaller documents such as short reports, memos, and proposals. These documents are the lifeline of day-to-day business communication. Informal evaluations suggest that this clarity of communication is invaluable from the standpoints of both the reader and the writer.

From the Reader's Standpoint

□ If you think about it, it makes little difference to you if your in-box is filled with ... 500 one-page documents, or 10 fifty-pagers, or a single 500-page document.



It does make a difference if most or all of the reports and memos contained in your in-box are written using Information Mapping's approach.

If documents follow Information Mapping's approach, they are much more scannable. Managers or technical persons can then prioritize their reading much more easily, and find the critical information much more rapidly. They can skip the unessential or irrelevant, and what they already know.

The lesson is that 10 fifty-page documents add up in complexity to one 500-page document. For this reason, using Information Mapping's method on smaller documents can be as effective in decision-making and time-saving as it is in a large document.

Largest Projects

□ We have also seen Information Mapping's method applied to very large projects. Here are some of the largest projects our staff has done.

Type of Document Measurement
Paper Documentation 3,000 pages
Training Course □ six weeks, 8 hours per day
Online Documentation several thousand screens
Online Reference answers to over 10,000 questions

Results: Upper Limits of Size Not Yet Reached

□ After surveying our project managers and our clients, we can say that we believe that we have not reached the size limits of the Information Mapping method. The method appears to get better the larger the document size. Since the method was designed to handle complexity, it appears to have met its overall design objectives in this regard. □ How do principles and theory apply when scaling up or scaling down (i.e., how would they apply to the design of very large and very small aircraft)? What is their comparative effectiveness in these different scales?

Scaling Up, from the Writer's Standpoint

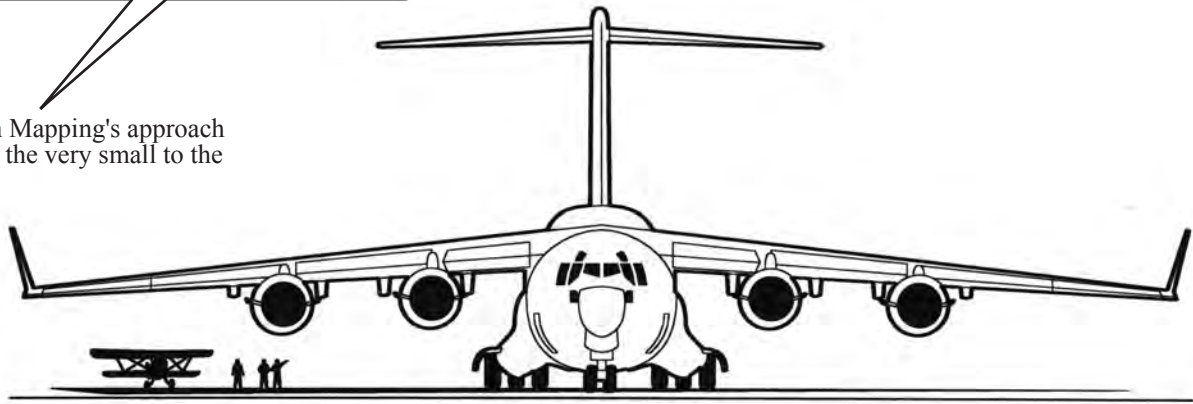
□ One of the lessons that we have learned in teaching 10,000 people a year to use Information Mapping's method is that our schools and colleges do not have a successful, systematic method for helping people handle the major problem of writing beyond two or three pages. That problem is organization. People are not taught to analyze and organize a document over 2 or 3 pages. Unless they've had a good course in report writing, a good coach, or plenty of native talent, most of them have no real means of sequencing subject matter effectively. □

Analogy in Aircraft Engineering

The questions that an aeronautical engineer would ask in this situation are:

How do principles and theory apply when scaling up or scaling down, i.e., to the design of very large and very small aircraft? What is their comparative effectiveness in these different scales?

Information Mapping's approach works from the very small to the very large.



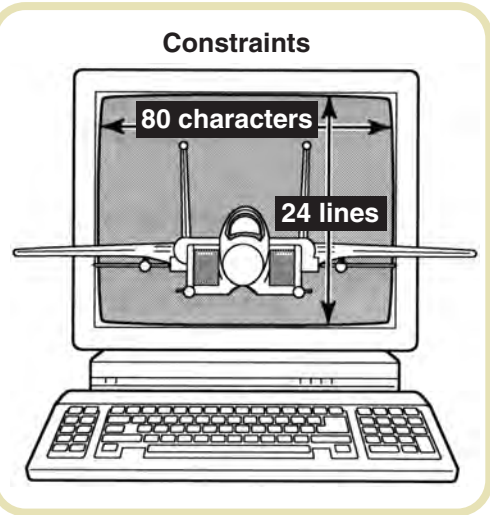
Does It Work in Very Constrained Situations?

Introduction

Information Mapping's method was initially designed for the development of many different kinds of paper documents. In the last few years, many documents have begun to be stored and displayed only on the computer screen. A logical evaluation question is: "How well does the method work on the computer screen?"

Constraints of the Computer Screen

Most of us are well acquainted with the constraints of the computer screen. First of all, most screens are too small to do a really good job of displaying learning and reference material. The average size page is a much better display area. Furthermore, computer screens are often harder to read than the printed page.



The Method Works Better Than Other Forms of Writing

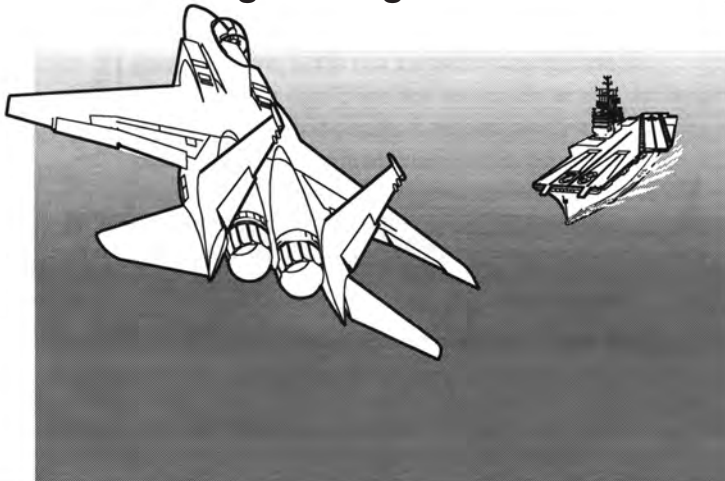
The answer to questions about the effectiveness of online text is that Information Mapping's method works very well, certainly better than any other methods proposed to date. A major reason is that the method uses the precisely defined information block which fits on even the smallest screens. Thus, one problem is solved. An adaptation of the block labeling and map-titling techniques of Information Mapping's methodology permit the design of screens that prevent most forms of cognitive overload and the problem of being "lost in cyberspace."

Analogy to Aircraft Engineering

A comparable aeronautical engineering requirement for working in very constrained circumstances might be:

Can an aircraft be built that can land regularly on an aircraft carrier that looks about the size of a postage stamp, bouncing around in the ocean waves?

Information Mapping's approach has worked in constrained situations very well.



Some Typical Applications of Information Mapping's Methodology to Online Text

Type of Project and Application	Client Organization	Application Scale	Software/Hardware
Online reference system for pharmaceutical evaluations	Major telecommunications vendor	Tens of thousands of screens, continuously expanding as new drugs are evaluated	Specially developed proprietary Tandem Computer software
User documentation for accounts payable software system	One of the two largest software vendors for IBM mainframe systems	Several thousand screens	Guide 3.0 Mainframes, Servers, and PCs
All field and credit procedures for retail stores	One of the largest national retail store chains	Eight million pages a year; analysis of current system to develop screens	Preference Mainframes, Servers, and Networks
Transfer of all procedural documentation—that used in-house as well as that supplied to customers—to an online system	One of the largest national mutual fund backend processing companies	12,000 pages of documentation	Preference Mainframes, Servers, and Networks
Instant online reference for account representatives for better customer service phone answering system	One of the largest national stock transfer companies	10,000 possible questions and their answers	Preference Mainframes, Servers, and Networks
Online marketing and sales information system	Mid-sized computer company	Several thousand screens of information	HyperCard Apple Macintosh

How Easy Is Routine Updating and Maintenance?

Introduction

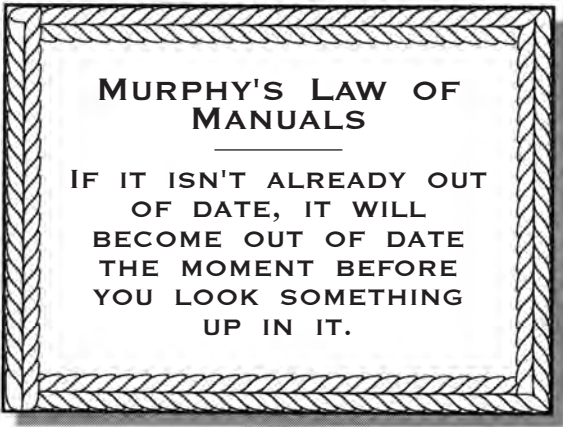
In organizations, documents seem to have lives of their own. Some documents start out as fairly modest booklets and grow to amazingly large books. Procedures and policies are continually changing, but a basic series of documents may continue to live on the shelves year after year.

Updating

This means that documents have to be updated. New additions, deletions, and replacements need to be added all the time. For some documents, only a few pages may be changed once a year. But for others, as much as 25% or more change can be expected annually.

People Don't Update Paper Manuals

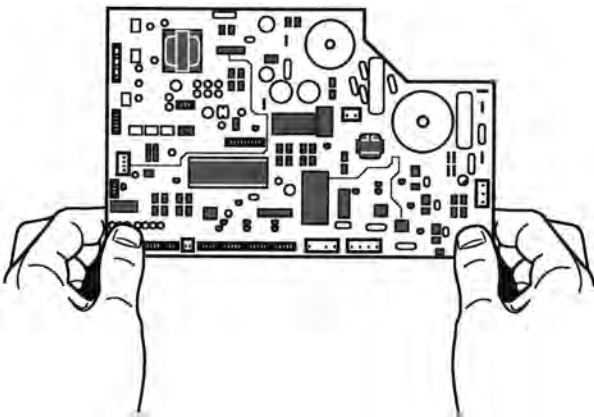
The maintenance problem is compounded by the fact that the updating task is often relegated to the bottom of the priority list. And the fact is that the Murphy's Law of Manuals holds: If it isn't already out of date, it will become out of date the moment before you look something up in it.



Plug-in Updating

The goal is to replace a single chunk of information in a large text without having to make extremely large changes in other parts of the text. The fact that Information Mapping's method divides the subject into precisely defined, clearly chunked information blocks makes the difference.

The goal is to replace a single chunk of information in a large text without having to make extremely large changes in other parts of the text. The fact that Information Mapping's method divides the subject into precisely defined, clearly chunked information blocks makes the difference.



In designing equipment for maintainability, engineers have begun to develop plug-in components. So, if a defective part is found, it may simply be unplugged and replaced with a new one without having to do costly on-the-spot repairs. The information block operates in an analogous fashion in documents prepared with Information Mapping's method.□



Aircraft Engineering Metaphor

The comparable situation here is the routine maintenance of aircraft. New parts are continuously being put into aircraft, while old parts are replaced. When a better subassembly has been designed, aircraft are routinely retrofitted. Over the course of 20 years, a considerable portion of an aircraft is replaced. The engines are overhauled several times and finally new ones are installed. When improvements in communications or better guidance radar are upgraded, whole parts of the aircraft may need to be replaced. Similarly, seats and other parts of the interior of the aircraft are routinely replaced during remodeling.□

Another

Changing the Tire While the Vehicle Is in

We are often called upon to develop documentation while the software is still being written and tested. Of course, that is better than writing it at the end of the project (which always misses its deadlines). In fact, the joke in Silicon Valley is that the first 80% of the software job takes 90% of the time and then the last 20% of the job takes another 90% of the time. One of our analysts once described the continuous changes that occur in software design while we are writing the documentation as "changing the tire while the vehicle is in motion."



Does It Work in Special Training Situations?

Introduction

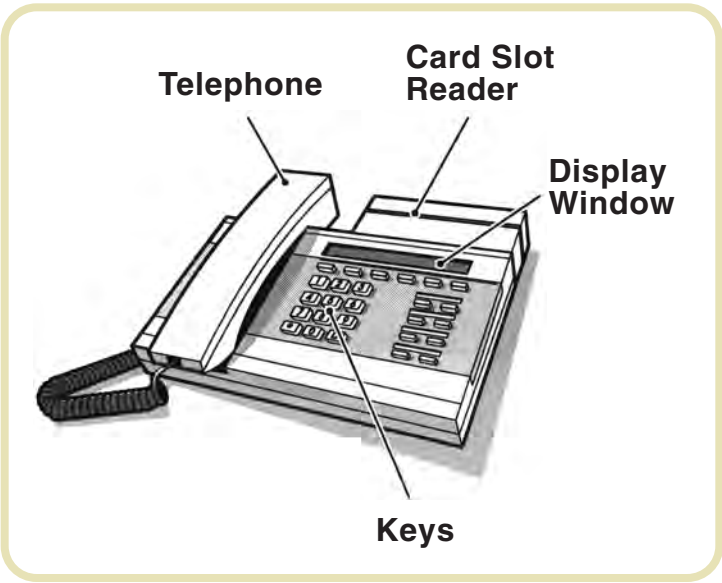
In today's competitive business environment, marketing can use all the help it can get. This section explains how Information Mapping used its analysis and presentation methodology to solve a unique marketing problem for Wells Fargo Bank.

Training Systems Help Sales and Customer Service

Helping clients to understand and use new banking services can often make the difference in the sale of the services. Wells Fargo Bank in San Francisco faced this challenge when it introduced WellService, a new credit-checking service several years ago. Banks are accustomed to training their own employees but are less familiar with training their clients-a practice more common in other industries. The problem was to train retail clerks in how to do a large number of credit checks each day quickly and easily.

The Credit-Checking Service

The credit checking service involved the now common act of inserting the customer's credit card into a special terminal connected to a phone line. The information was transmitted to a central Wells Fargo computer which ran a credit check and reported back to the clerk in the retail store. It was a rather simple, straightforward operation. The problem was training clerks to do it quickly and accurately.



The Scenario: Busy Retail Setting for Operation

Imagine being behind the counter of a busy retail operation. People are waiting in line, asking questions, wanting to be served.

Low Level of Education and Little English Spoken by Clerks

The clerk to be trained typically had a sixth-grade education. Half of the clerks in the training population spoke English as a second language. Moreover, the turnover of retail clerks was very high. It would be prohibitively expensive to send a professional trainer out to show the clerks how to operate the credit checking terminal. Training had to be done by the store manager or, if the store manager was too busy, the training had to be self-paced. Relatively unskilled people, not reading English very well and working under pressure, had to enter the data correctly the first time for the system to work. With the added complexity of the rapid turnover of retail clerks, you have a significant data entry problem.

The Task

The credit-checking service itself was to be done on the GTE credit card-checking terminal shown in the drawing. When a customer presented his or her credit card, the clerk would slide the card through the slot in the top of the telephone and perform one of the procedures. Which kind of card? Was the customer using a California driver's license? Was it an out-of-state driver's license number? Did the customer want to cash a personal check? A company check? These and other variables had to be processed by the clerk.

The pricing and profitability of the service required that store managers be trained in the installation of the credit phones. They were also required to perform certain start-up, preventive maintenance, and diagnostic tasks which also had to be done in a self-instructional mode. It meant the reference materials had to work, or Wells Fargo would have had irritated customers all over California. Ruth Gilbert, the project manager for Wells Fargo, selected Information Mapping, Inc., to analyze the job and come up with a training package that would solve the various problems and help potential customers overcome their reluctance to buy the service. This would give the bank an extra edge over its competitors in the fierce struggle for banking business in the California marketplace.

Function as Both Training and Job Aid

After analyzing the situation, Information Mapping began to draw the outlines of the project. Because many of the clerks did not speak English well, the manual had to contain as few words as possible and rely more heavily on pictures and other graphics. The manual had to be quickly opened to the specific procedure and the clerk had to be able to do the whole checking procedure from that single page. Thus, the material had to function as both a training device and a job aid that enabled the clerks to retrieve just what they needed for the task- nothing more, nothing less. It had to handle all of the exceptions and error messages. Above all, it had to be simple to use and to learn from. It also needed to incorporate a section on installation and maintenance for store managers.

Task Analysis

Applying the principles of the Information Mapping method and training technology, analysts from Information Mapping, Inc., prepared a complete task and content analysis of the entire document. They worked closely with subject matter experts at Wells Fargo, and conducted numerous tests with the equipment under simulated field conditions. The task analysis provided a precise description of what the clerk or manager had to do in every conceivable situation. The content analysis provided a similar description of what the clerks or managers had to know in order to do the tasks.

Eliminate Most of the Words

After conducting a content check for accuracy and completeness, the team focused attention on content analysis and refinement of the task in order to eliminate most of the words and replace them with drawings and other graphics.

If your terminal shows...	Then...
RE-ENTER CARD	turn to 
DECLINED	have customer call the bank where card was issued.
CARD EXPIRED	do not accept. Card is not valid.
LINE BUSY	turn to 
AMT. ERR	check amount and decimal and re-enter amount.
PLEASE RE-ENTER	Press  start entry again.

The illustration shows how a more complicated decision was handled by the design.

Design of Manual

The manual was printed in three colors. Red-the actual color of the characters on the terminal screen-was used in the manual for consistency. The manual was designed to be rugged. It had to survive intact from year to year on a wide variety of retail counters. It was printed on very heavy sheets of laminated card stock so that it would not tear, especially along the edge where it was held by the three-ring binder. The binder itself was custom-designed to fit alongside the terminal in the open position for easy access. It could also be closed and shelved like any other reference binder.

In-house and Field Tests

To make absolutely certain that the manual would work, it was tested in two ways. Simulated in-house tests with naive subjects were performed at Information Mapping and at Wells Fargo. This was followed by a full-scale field test with actual clerks and managers. Results of Tests Ruth Gilbert told Information Mapping, Inc., "The manual worked perfectly from the beginning. It was an excellent combination of reference and training. The design was distinctive enough that it added to the marketing effort and made the service easier. There were very few questions phoned in by the clerks and managers who use the service all over California." The result was greater sales and better service.

Besides All That Efficiency and Effectiveness, Can You Provide an Attractive and Comfortable Journey?

Introduction

Information Mapping's consultants have developed a lot of documents that don't have to win prizes at an art show. Desk procedures are often of this kind. They just have to do their job of communicating information clearly. But in other cases, the situation requires that the document be attractive enough to make the reader as comfortable as possible.

Example: Marketing Communications

Information Mapping's method has been used repeatedly in the preparation of marketing communications, especially when complex products or services are involved. Here the customer of our client is going to use the document. For such marketing and sales situations, it must be as attractive as possible.

We present three different presentation situations.

Example One: The Clear, Easy-to-Read, Easy-to-Scan Business Look

Here is a standard, everyday business form written in the Information Mapping method.

Aircraft Metaphor

The comparable situation here is the attractiveness of the aircraft inside and out. How comfortable do the passengers find the seats? Is the lighting right? Is the paint job inside and out attractive?



Information Mapping's method has provided a very comfortable "ride" for many years.

How to Prepare Data for an Audit

Introduction

One of the most important procedures in an audit is preparing the data.

Careful preparation ensures that the data is correct and that each step of preparation has been carried out.

Prepare

Follow the steps below to prepare for the audit.

Step	Action				
1	For data items selected for the audit, obtain the following: • source documents, and • run data from the computer room.				
2	Verify the source document samples by comparing the samples to the original list.				
3	Record on a worksheet sufficient descriptive information to provide accurate identification for future audits. <table><thead><tr><th>Minimum Information Required</th><th>Examples</th></tr></thead><tbody><tr><td>Attributes of the sample</td><td> • Sales Territory • Effective data </td></tr></tbody></table>	Minimum Information Required	Examples	Attributes of the sample	• Sales Territory • Effective data
Minimum Information Required	Examples				
Attributes of the sample	• Sales Territory • Effective data				



Example Two: A Readable Screen in Highly Constrained Display Conditions

It is not easy to produce readable material on some screens. We often find the screen too small and the type choice limited. But the precision chunking provided by information blocks enables the information to be displayed with maximum ease of reading.

XYZ Company Administrative Systems

Screen 9.0

7/1/85

SAFEGUARDING PROPRIETARY INFORMATION

OVERVIEW:

INTRODUCTION: This section covers policies and practices governing proprietary information and restrictive markings. While this section sets forth guidelines for handling proprietary information, it cannot cover all circumstances. There is no substitute for using good judgment on the part of every Company employee.

EMPLOYEE'S RESPONSIBILITIES: XYZ Company employees are obliged to protect proprietary information as a condition of employment. This responsibility extends to proprietary information received from others in the course of work activities

PLEASE ENTER YOUR SELECTION:

Next screen

Previous screen

Related topics menu

Main menu

Example Three: The Fully Graphic Look

The method can be given full visual treatment, as shown in the example below.

BAKE A PLATE V130

5 Installation

44 Jul '85

9.2 Removing the top cover plate of the BAKE A PLATE V130

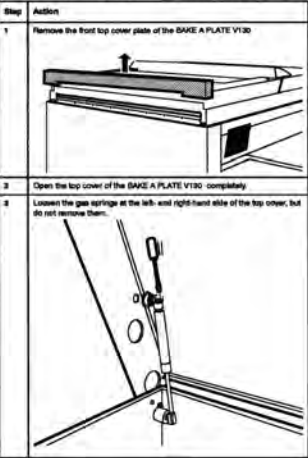
Introduction

To commence installation of the BAKE A PLATE V130, the top cover must first be removed. This section will provide you with all necessary information to do so.

Removing the top cover

Proceed as follows to remove the top cover of the BAKE A PLATE V130:

Step	Action
1	Remove the front top cover plate of the BAKE A PLATE V130
2	Open the top cover of the BAKE A PLATE V130 completely
3	Loosen the gas springs at the left- and right-hand side of the top cover, but do not remove them.

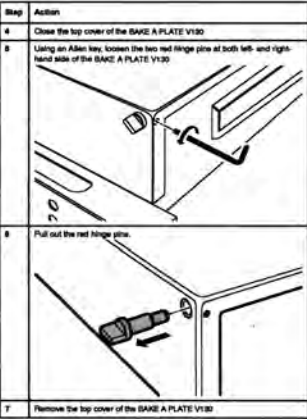


BAKE A PLATE V130

Installation 5

Jul '85 45

Step	Action
4	Close the top cover of the BAKE A PLATE V130
5	Using an Allen key, loosen the two red hinge pins at both left- and right-hand side of the BAKE A PLATE V130
6	Pull out the red hinge pins
7	Remove the top cover of the BAKE A PLATE V130



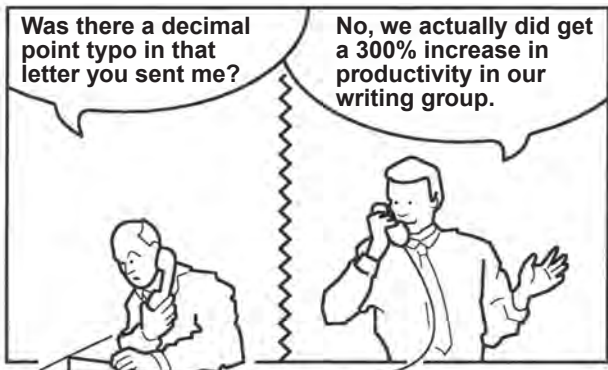
Does It Increase Productivity?

User Reports a 300% Productivity Increase

In one of the earliest seminars that I conducted, there was a young parts and procedures manager named Bob Labossier who was working for the makers of Nissan automobiles in the United States. He sent his entire staff to one of our seminars. After his staff had learned Information Mapping's method, he wrote me a letter in which he said that he had increased the productivity of his procedure writers by 300 percent.

I Suspect Error

I read the letter three times. I couldn't believe what I had read. I knew that Information Mapping's method would improve writer productivity, but I had no idea that it might improve it that much. As I thought about it more and more, I suspected that his secretary had put an extra zero in the letter when typing. Around 30 percent would certainly be a more realizable and realistic goal for most organizations.



Double-Check Reveals no Error

So I decided to call Bob and ask him to verify the figure. He said "No, there was no mistake."

He said he had kept very careful records of the output of his writers over the past years and had tracked them for six months after they learned structured writing in the seminar. The productivity increase was definitely 300%.

Explanation of Productivity Increase

I asked Labossier how such a high productivity increase could happen.

Faster and Better Analysis. "Well, the savings come from all over. Part of the increase came from better analysis. You don't have to redo a good analysis. We frequently had to start all over from the beginning because somebody started the analysis from the wrong perspective in the past."

Faster Writing. "Part of the increase also comes from faster writing. My writers get the first draft done faster, because they know precisely what they're supposed to do. And they know when to stop! They don't write endless details-only the relevant ones."

Faster Review. "Finally, another part comes from faster review time. Less time waiting for upper-level managers and technical experts to approve. Not that they're sitting around, but any delay in approval and review tends to slow down the whole process."

Half the Job of the Procedure Writer Is Answering the Phone

Here's another story. It goes under the category of "watch for things that don't happen," or in evaluation, "pay attention when nothing happens!"

In one large organization that had almost 1,000 writers we found that one of the major job responsibilities of a procedure writer was to answer the phone for questions from the field.

The questions occurred because material they'd written was ambiguous and the people in the field could not understand parts of it. No exaggeration here-managers fully expected 50% of a writer's time to be used in answering the phone for questions from the field.

One supervisor was assigned to write procedures related to labor relations. As soon as a labor contract was signed, she had 30 days to get new procedures out into the field and into the hands of first-line supervisors. Just after she took Information Mapping's course, a labor contract was signed and she wrote a group of new procedures with her new skills.

Nothing Happened

As usual, the woman who wrote the procedures set aside the following week to answer the phone. Much to her surprise, however, the phone did not ring. Accustomed to handling many foul-ups, she began to get worried-perhaps the procedures got lost.

At that point, she started the sensible troubleshooting procedure.

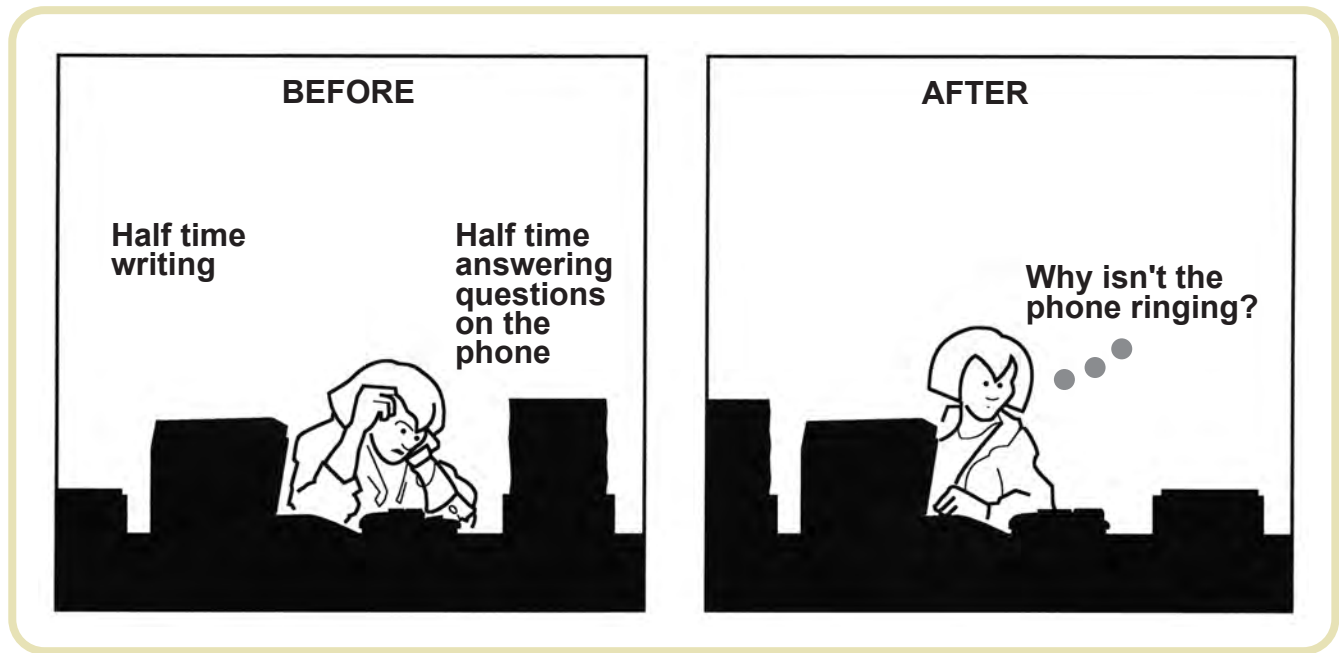
□ She tracked down the print shop and asked them if they had printed the procedures. Yes, they had printed them. She called the mailroom supervisor to ask if the procedures had been sent out. Yes, they had been sent out.

She couldn't blame the lack of phone questions on the mail-room. The U.S. Postal Service must have lost them.

To check if the procedures had arrived at their intended destinations, she called a supervisor in the southern part of the state.

Yes, the procedures had arrived. Yes, he had given them to his workers.

No, there were no questions. "Why should there be questions? They were very clear," he said. Now she does not schedule half her time to answer questions. She has, in effect, doubled her efficiency. □ □ □

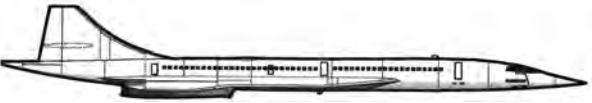


Is It Cost-Effective for Its Mission?

Introduction

In business, a critical question about any product or service is: "Is it cost-effective for its mission?"

Just because an aircraft can be built, and even though people like to fly in it, it doesn't automatically follow that it will be cost-effective. The British and the French, for example, found that the Concorde, which flies at supersonic speeds, could not be operated profitably, even on the most heavily-traveled trans-Atlantic air routes.



The Cost-Benefits Questions

Similarly, in the fields of training, documentation, and writing, the cost-benefits question is paramount. For these endeavors, getting the cost and benefits information together requires the analysis of your information inputs and outputs. Thus, the major question must be asked: What are the costs and benefits of specific applications?

In order to answer this question, you must consider that the costs and benefits are quite different depending on your point of view, i.e., whether you are looking at the benefits from the standpoint of:

- the reader or user of information,
- the writer, or
- the organization.

We will now examine these three cost-benefit perspectives.

1. Costs and Benefits for the Individual Writer or Analyst

The Writer's Perspective

The question from the standpoint of the individual analyst or writer is, "How much time/stress could I save after becoming proficient in Information Mapping's method?"

When you are examining this question from the standpoint of your own job, certain numbers will be significant. According to one widely quoted study, managers will spend 10 to 20% of their time analyzing and writing. Technical people may spend up to 90% of their time in these activities.

Benefits

Benefits include:

- More time available to solve major job-related problems and less time writing
- Better analysis of problems
- More productive meetings (because of better preparation)
- Less time answering questions from recipients of your communications (because you have been clear and complete)
- Personal energy savings (which may be greater than hours saved, because analysis and writing are often experienced as the most difficult and most tiring activities of the day).

Cost Factors: Here are some of the factors to consider

When calculating costs, consider these factors:

- training time and tuition
- time away from the job.

Typical payback periods average one year.

If you use three-year payback as a criterion for a worthwhile investment return, the personal and organizational rewards are well worth the

2. Costs and Benefits for the User or Reader

The Reader's Perspective

The question from the standpoint of the individual reader is:

"How much more efficient and effective could I become if everybody in my organization delivered documentation and reports to me using Information Mapping's method?"

If you are on the receiving end of information, you have a different costs and benefits perspective. Recent surveys have suggested that 50 to 70% of the written communications that managers receive are written by people who report to them. This means that managers can control 50 to 70% of the quality of what comes to them. And other observers have calculated that an average manager may well read or skim a million words a week.

Benefits

Much of the benefits come from time saved in search and retrieval and less training time. We saw earlier that Pacific Bell saved 50% training time in one course. But benefits also have been identified in terms of more attention focused on real problems and better analysis done by readers based on better information provided.

Cost

To figure costs, the manager can estimate the amount of time spent reading during the week. Reading time can easily reach 2 hours per day if evenings and weekends are included. This time spent includes going through the in-box daily, looking up policies, procedures and guidelines, reviewing training materials and instructions, and reviewing drafts of subordinate and peer-written material. The use of Information Mapping's methods by all of the people in an organization can save up to 50% in reading and review time.

To save training and documentation costs internally, some organizations have insisted that their suppliers use Information Mapping's approach for product documentation. Consider what the savings to a large engineering organization would be if all documentation from their vendors met the quality control standards described in this chapter.

3. Costs and Benefits for an Organization or Project

The Organizational Perspective

The question from the standpoint of the organization is: □ "What are the costs and benefits of specific projects or operations if they are done using Information Mappings's method?"

Benefits

The benefits obtained by a whole organization depend on the type of company. Every cost-benefits study will be unique. For example, the benefits to a package software company will be calculated in terms of:

- increased sales,
- increased customer satisfaction,
- lower costs in customer service, and
- lower overall documentation costs.

The benefits realized by companies that write their own documentation in their Management Information Systems departments are quite different. Some of these benefits would be:

- higher-quality system use;
- increased productivity of writers, analysts, technical, administrative, and managerial personnel;
- reduction in time spent by subject matter experts;
- fewer errors;
- reduction in time spent by supervisors answering questions;
- reduced training time; and
- reduced hotline costs.

To calculate benefits, each department, company, and industry would have a different profile.

Costs

Typically, the major costs would be in training people to write using the method. □

How Do You Evaluate the Parts and Subassemblies?

Aircraft Engineering Analogy

Are the parts and subassemblies selected for an aircraft? How do they know the parts will work? What are their properties? The documentation engineering equivalent of these questions can be translated as:

- What are the principles and criteria you used to select and build the parts?
- What is the research on the various parts of the system?
- What are their operating characteristics?

Introduction

When engineers design an aircraft, they use the best components. They make sure that each of the components has been tested and evaluated by its manufacturer. They test the quality control and assembly line methods used in putting together the aircraft out of the components.

Research on the components of Information Mapping's method has taken place in a variety of fields over the past 50 years. We have relied on work from:

- cognitive psychology;
- learning and education;
- human factors engineering;
- communications;
- advertising;
- graphics, design, and typography;
- linguistics; and
- artificial intelligence.

Engineering Analogy

If we think of Information Mapping's method as a kind of documentation engineering, we realize that only recently has the field emerged as a field by itself. It does not have a separate research community distinct from the fields mentioned above. One may think of its reliance on other disciplines as similar to engineering's reliance on research in the basic sciences.

Much Research Done In Many Disciplines.

It goes far beyond the scope of this chapter to summarize all of the research we have relied upon to design and build the components of the Information Mapping method. But basically, in the chart on the facing page, we divide the studies by their range of applicability.

For instance, there is basic psychological research on the capacity of human short-term memory. It concludes that human beings have two different kinds of memory: short- term and long-term. Further, that we have very limited capacity for holding information in our short-term memories-somewhere between 3 and 9 chunks. Just as the aircraft engineer is always working against gravity, the documentation engineer or writer is always working against the limitations of human memory.

Experiments on Specific Elements of the Method

This level of experiments includes work on specific elements of the display aspects of the method. I have summarized a number of these in Mapping Hypertext, Chapter 8, including classic papers by Hartley and Trueman (1983) on the effects of headings on retrieval, and Reid and Wright (1973) on visual structuring of information. Reid and Wright's study comparing the usefulness of particular kinds of graphic constructions (tables, trees, lists) with prose paragraphs is applicable only to certain subassemblies in certain kinds of documents. Some psychological and linguistic research (e.g., a whole series of papers by P. C. Wason) has focused on identifying the types of grammatical constructions that are likely to produce errors in human information processing. This research is applicable only to the construction of certain sentences. It is important to note that these are not studies on Information Mapping's method, but on elements which are used in it.

Experiments on Basic Human Capabilities and Characteristics

These experiments include such basic studies as how human short-term memory works and what its properties are. We have summarized a number of these in Mapping Hypertext, Chapter 8, including classic papers by G. A. Miller (1956) and Herbert Simon (1979). Studies on how human beings learn concepts would, for example, be utilized at this level of synthesis of a methodology.

Experiments and Evaluations of the Whole Methodology

Many of the studies described in the following chapter compare the outcomes of learning or preparing reference material according to the method with material prepared in other fashions

Can You Measure Critical Variables in Its Components?

Introduction

Precise measurement has improved efficiency in science, technology, and business.

Let us think about measuring different variables that appear in text. Is knowing how many words are in a manuscript a meaningful measurement? Yes, to some degree. You can determine approximately how big a job it will be to read or store it all. But it tells you little about the contents. Suppose you counted all of the paragraphs. What would that tell you? Not too much, because a paragraph, as we all know from casual reading, can be anything from one sentence to a whole page. So a paragraph count might give you a rough idea of the size of the manuscript, but it is not as precise as a word count.

Counting Blocks

Documents developed according to the Information Mapping's standards of structured writing give us greater possibilities in content measurement. We can count blocks. Because each type of block is developed according to a specific set of criteria, they are comparable, and hence, countable. If we say that there are 29 definition blocks and 185 example blocks in a given book, we know something very precise. If we say that there are 1,726 blocks in the total document, we know something much more useful than a word count. A word count includes all of the relevant and irrelevant words in a document. We can even get word counts of sloppily-written documents. But a document written following the guidelines of Information Mapping's method enables us to know a great deal about the contents because we know the total block count and the count of different types of blocks.

Counting Task-Oriented Procedures

Procedures are also worth noting. We know how much task-related learning must take place from a structured document, because we know that the procedures and decisions have been developed according to specific guidelines. This means that we can count the number of individual procedures and also the number of steps in each procedure. So, it becomes very meaningful to say, for instance, that out of 1,726 blocks, 299 of them are procedure blocks and these procedure blocks contain an average of 8.2 steps per procedure.

If we have a document of 1,433 blocks and only 22 procedures averaging 4.3 steps, we can anticipate quite a different sort of learning (or writing) task.

Use in Planning Stage

This ability to be precise gives us a very powerful tool for various practical and research-related tasks.

On the practical side, suppose that we are asked to write a particular kind of document-say, a personnel manual. We can examine several examples of manuals that already have been written according to Information Mapping's method, and make a good estimate of the size and difficulty of the task facing us, even in the absence of the actual subject matter. Of course, when we can examine the documentation that can be used in the preparation of the new manual, we can estimate the difference between what we have and what needs to be done. This is of considerable value to the project manager and writers, no matter what level of formality is used in the examination. Because the documents have been chunked precisely into blocks, they provide an intuitive guide to the kind and number of blocks that one can expect to write in the project.

This provides guidance of invaluable assistance at a very critical stage of the project.

Evaluation and Quality Control

Measurement (i.e., counting of critical variables such as blocks) can aid in quality control and evaluation of a final product. One such case is the definition-example ratio: If the ratio of definition blocks to example blocks is high, the learn- ability of the material for naive learners may be smaller than if the ratio were lower. This means, for instance, that if you have 50 definition blocks and only 30 example blocks, the material will be harder to learn for a group with low ability or which lacks prerequisites than it would be if it had 50 definition blocks and 150 example blocks.

Research Applications of Block Counts

The ability to count blocks and other features of texts prepared according to Information Mapping's method gives a researcher a precise measurement of the difficulty and content of the subject matter.

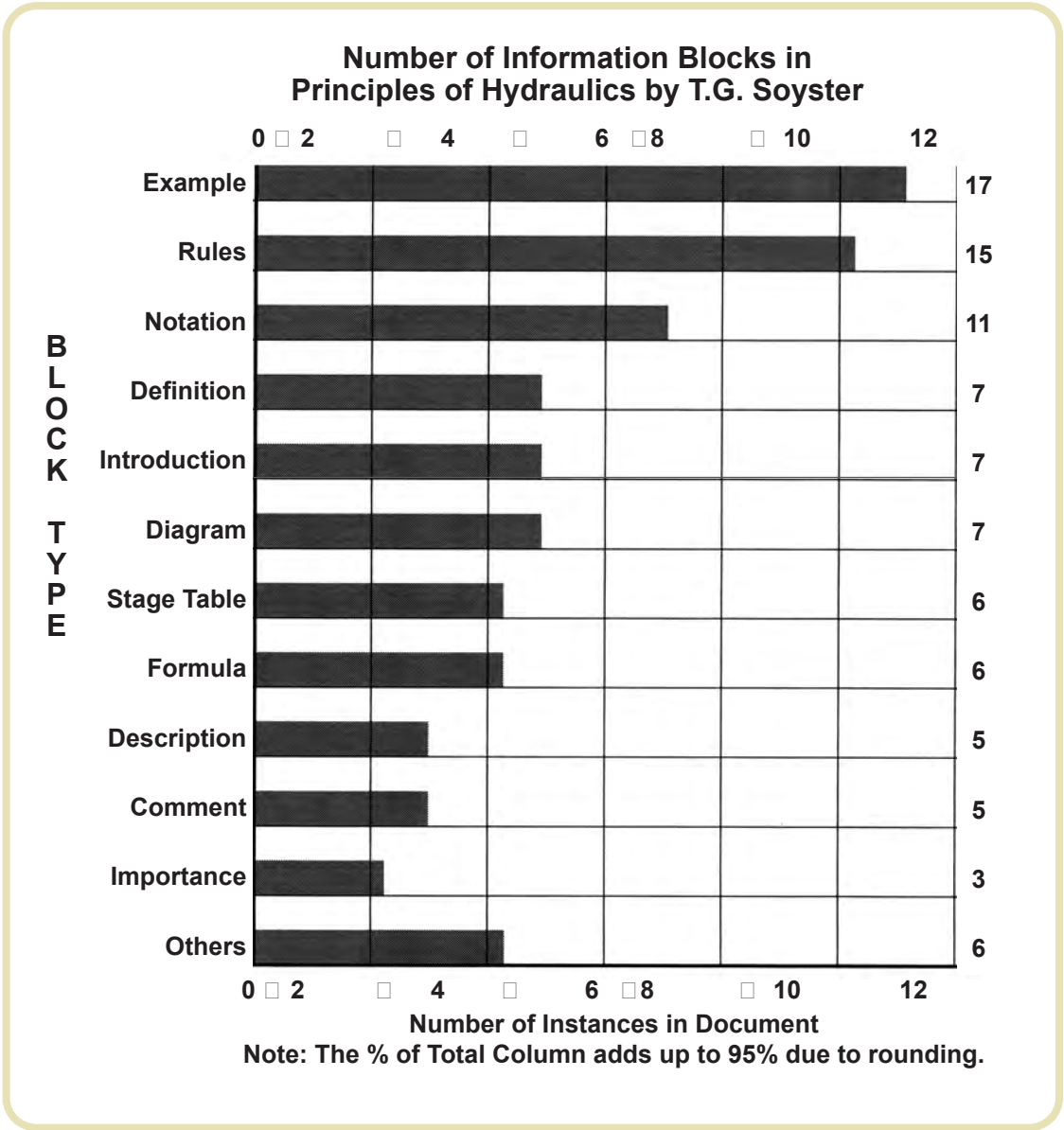
When the researcher wants to examine all of the blocks of a given kind, they are countable, identifiable, and comparable, and they can be examined in their contexts.

Different Document Types Have Different Proportions of Block Types

One of the interesting results of investigations of this way of counting content is that similar manuals give similar profiles of block types. If you got together 100 procedure manuals or 100 policy manuals, you would see a great similarity of the kinds in information blocks appearing in them.

The Data

The document described in the chart below is one that was used in two of the experiments described in the next chapter (those of Soyster and Hauck). The chart illustrates how it is possible to describe the content in a meaningful way without specifying the actual terms used in the subject matter.



Can You Do Creative Things with It?

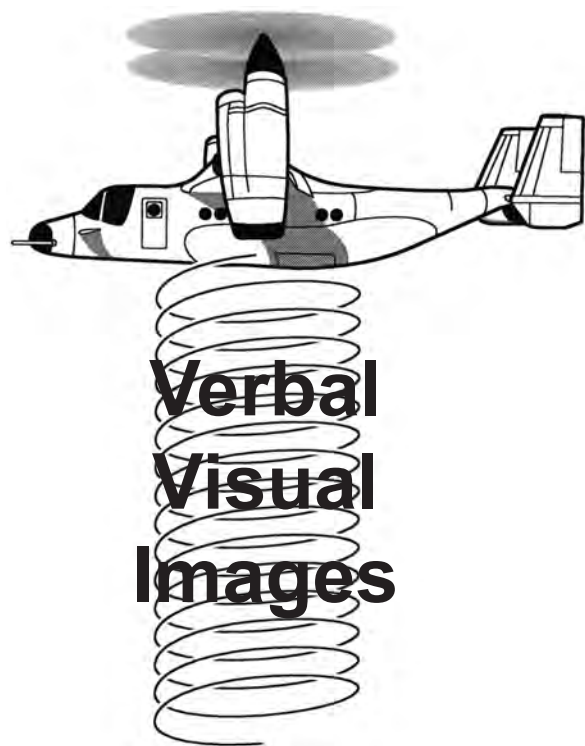
Introduction

We have described a considerable number of very precise ways of developing structured writing. Having seen the documentation engineering metaphor throughout this section, the reader may have formed the impression that writers are left very little with which they can be creative. This is far from the case.

Creativity Always Works within a Context

Whether we are examining writing, engineering or any other art or science, we see that creativity does not just magically happen. Creative works don't pop into existence. Creations make use of standard situations and materials. Creation assumes contexts.

You can expect similar outcomes with Information Mapping's method. Yes, there are a great many guidelines. Yes, the practitioners must have learned these guidelines and concepts before they can expect creative output. But that is not the whole story. Creativity abounds in some documents that follow the guidelines of the method.



Format and Placement Design

Opportunities for Creativity

Some aspects of a technology or art form present greater opportunities for creativity than others. What are some of the opportunity areas for creativity in Information Mapping's method? Here are some:

Examples. The creation of vivid, clear, interesting examples is perhaps the greatest continuing opportunity for creativity. Examples frequently represent the greatest amount of writing in a document, and the development of the "right" example can give the reader the concrete feeling of being there, seeing it, knowing it.

Metaphors and Analogies. Functional communication material used in business and technology can benefit greatly from apt metaphors or analogies. They can carry the reader along, like skiing down a slope, whereas inept metaphors can confuse the reader, like running into a grove of trees halfway down the mountain.

Verbal and Visual Imagery. Images are sometimes the spotlights of a paragraph or block. They brighten up and focus the reader's task.

Placement and overall design. Another opportunity for creativity within constraints is the use of different formats and graphic design layouts for presenting material. Obviously, this requires additional skill, and we have frequently recommended that clients use one of several standard formats for displaying the Information Mapping method rather than creating new ones. The major reason for this is that format is very important for enabling scanning and retrieval of information from a page. Tinkering with the type weight and style of headings and text can seriously contribute to or impede a user's ability to use the material effectively and efficiently. Therefore, we recommend the value of ease of use for the reader over the frequently emphasized values of novelty, style and expression.



These images can be either verbal or visual.

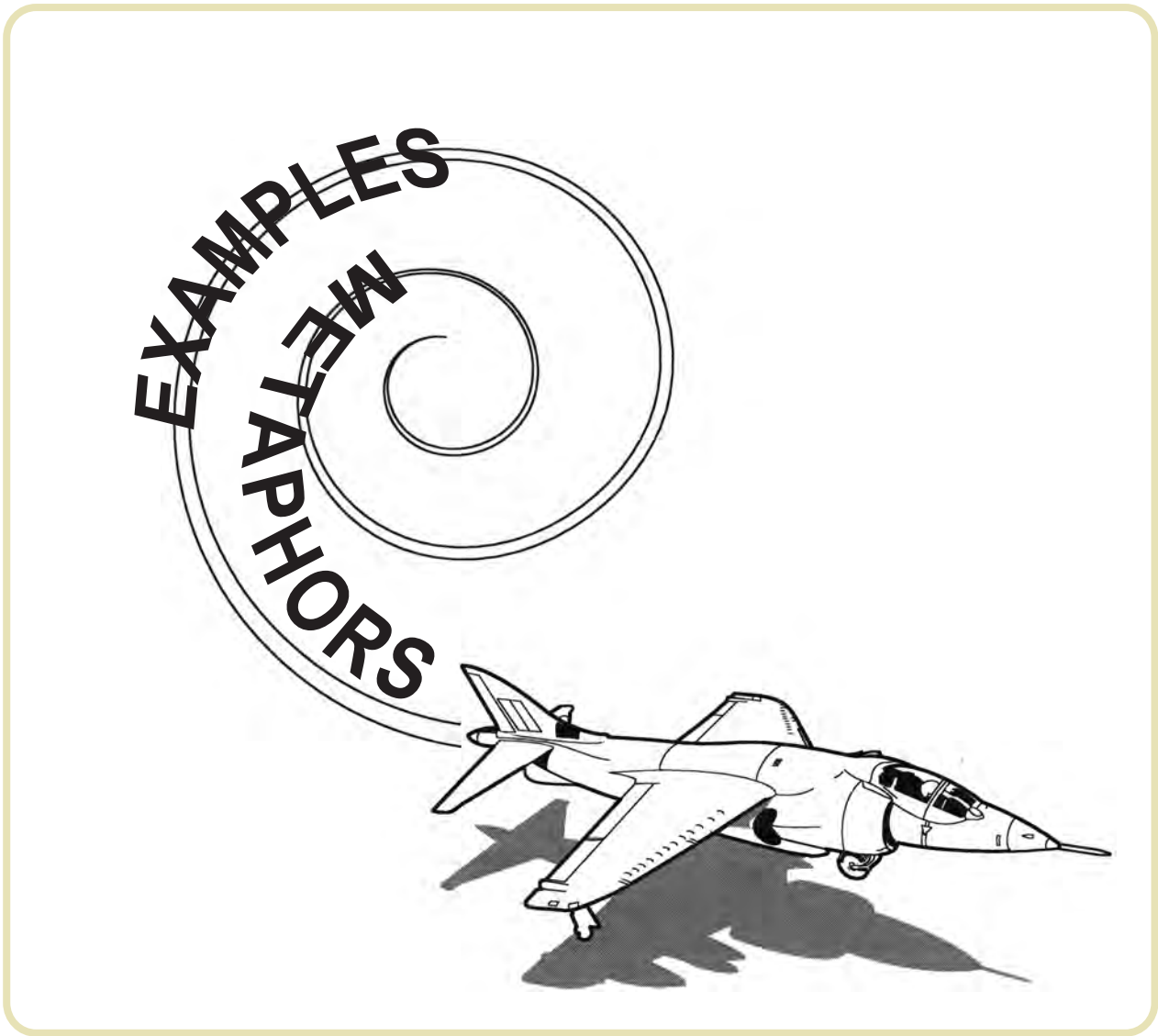
Comment on the Aeronautical Metaphor

"Can the aircraft do loops and rolls? Can it land on a dime? Can it fly onto a little Pacific island that is perhaps the most beautiful place in the world but has a tiny landing strip? What color will the plane be painted?" These are not the first questions aircraft engineer address when they design and build aircraft. But these questions may be very important to particular groups of users.

Similarly, the questions of creativity in using Information Mapping's method arise after the writer has mastered the fundamentals of the craft.

Another Metaphor: Architects and Engineers

Perhaps one way to illuminate the relationship between creativity and the discipline of Information Mapping's method is to look at an architect's dependence on engineers. There are some fundamental engineering disciplines, such as structural engineering, that are supremely important in the designing of buildings. Similarly, I like to think of Information Mapping's method as a kind of structural engineering, and creative expression as the addition of certain kinds of form and detail to the overall structure.



Will It Aid in Discovery of Design Flaws in Other Parts of the Process?

Introduction

The topic we turn to next is not necessarily one that we would set up as a requirement of a communications methodology when initially developing it. But we have done a large number of projects in computer documentation. In each of them, the evidence began to accumulate that we had uncovered an unanticipated, yet extremely valuable aspect of Information Mapping's method.

The design of computer software has become one of the most complex design activities that humans undertake. Complex activities are the breeding ground for error. While there has been a great deal of progress in structuring the design process so that errors are reduced, commentators still estimate that there is one error in every hundred lines of code.

Some of the most pernicious errors are those that happen early in the design process. If the level of complexity is high, it is inevitable that software engineers will leave out important specifications. Moreover, there is always a tendency to overlook the interactions of different complex parts that may produce unanticipated difficulties for users.

Information Mapping's Role in Quality Control

Very often when our documentation project managers and information analysts begin working with software teams, they will ask a series of questions generated by the structured methodology of Information Mapping's method. Quite often these questions will result in the expert pausing and then saying: "Oh, my God, we didn't think of that! How did you think of it? You've only been learning about the system for a couple of days, and I've been working on it for a year!"

Why the Method Uncovers Errors and Design Flaws

We began to get interested in this design flaw discovery feature of Information Mapping's method after this happened several times. We believe there are two properties of the method that make it easier to discover errors when applied in software engineering projects.

Example and Non-Example Generation. One of the specifications for the technical analysis of concepts in Information Mapping's method is a requirement to generate sufficient examples to cover the range of attributes of a concept. This means that the definition of the concept is tested across all of its significant dimensions.

In software engineering, one typically generates data sets to test all of the dimensions of a given numerical routine. The generation of examples in Information Mapping's method is analogous to these test data sets.

Furthermore, Information Mapping's method has a specification for the generation of non-examples that will communicate to the user its limits or instances in which a concept or function does not apply. Non-examples also act like a data set test situation in which you generate a set of wrong data to see how the software calculates on it.

Recursive Question Generation. One of the important properties of Information Mapping's method is that it enables information analysts and writers to generate questions. These questions are triggered by empty blocks (i.e., information blocks that should be a part of a given map about a topic but for which the writer has no information). This typically triggers the writer to go to the subject matter expert-the software engineer-to obtain the answer. Because our theory suggests that different types of information should have very specific pieces of information associated with it for good communication, particular questions get asked. And these questions are very frequently more systematic than what the software engineer has used to figure out how a particular part of the software operates.

I want to be clear here that I believe that many of the errors that Information Mapping's analysts are able to catch are those which would have eventually been caught somewhere along the line, in alpha or beta tests. But these errors should not be permitted to get that far. As we know from studies of software engineering economics, the later the error is found, the more expensive it is to the development process.

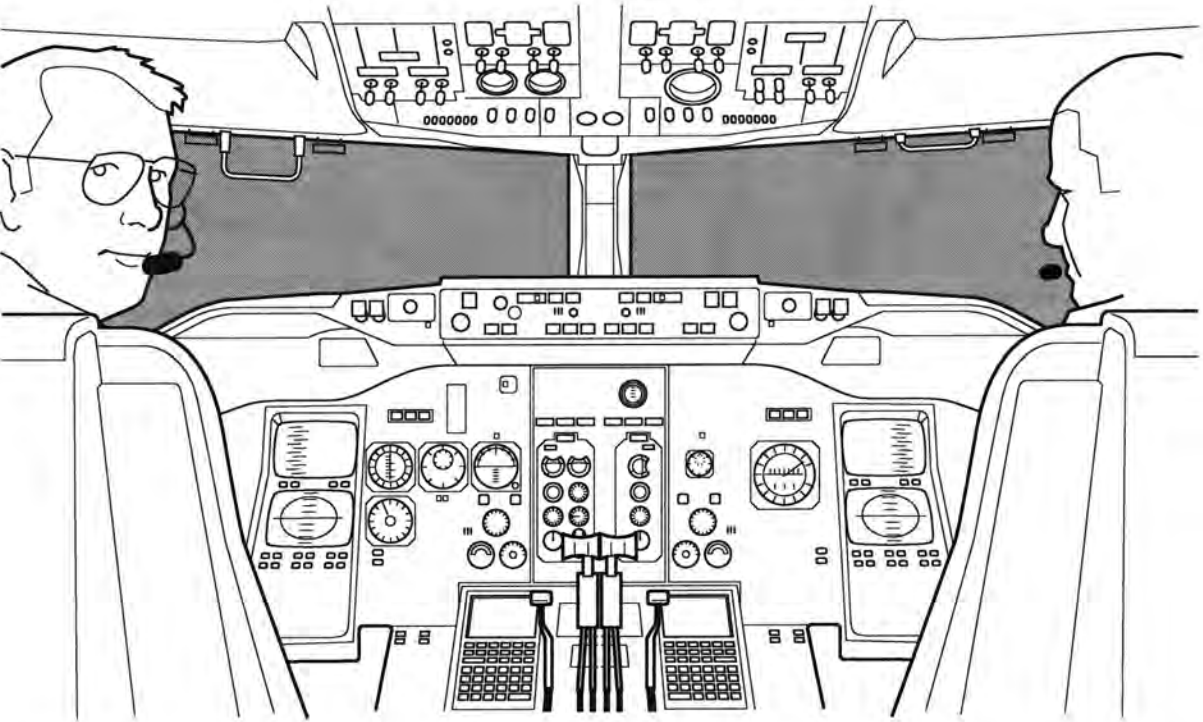
Suggested Solution: Develop User Manual First

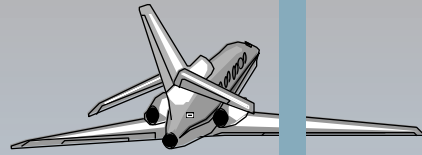
One of the things we have frequently recommended to clients is that they prepare the user manual of the documentation first, at the time the product is being specified, rather than at the end of the project. The design flaws normally caught in our process of developing the manual are thus caught early enough to save a great deal of money.

Comment on the Aeronautical Analogy

Perhaps the "flaw discovery" property of Information Mapping's method described on these pages would be very much like the systematic planning software routines that engineers use to check their designs. Or perhaps it is a way of putting the aircraft in the wind tunnel to see how it will react. Both test the properties of the aircraft under different conditions.

Similarly, an analogy can be drawn to cockpit design tests where test pilots sit down in a simulator to determine if the dials and controls are usable, and to make suggestions on how something would be better from the pilot's point of view.





How High Can It Fly?

Examining the Evidence on Information
Mapping's Method of High Performance
Communication

by
Robert E. Horn

Chapter 2



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Note

If you do not have Chapter 1 or 2, please download it from:
http://www.stanford.edu/~rhorn/a/topic/stwrng_infomap/tocStructrdWriting.html

Overview of This Chapter: Abstracts of Research

Introduction

We can evaluate training and retrieval methodologies in a variety of ways. We have surveyed these evaluation approaches in the previous chapter. In this chapter, we present more detailed abstracts of major research and evaluation studies conducted in universities and in business. These studies have covered a wide range of subjects, training and retrieval situations, and learners. The emphasis in this chapter is on presenting results of research done independently of Information Mapping, Inc., but focused on its methodology.

Charts on These Pages

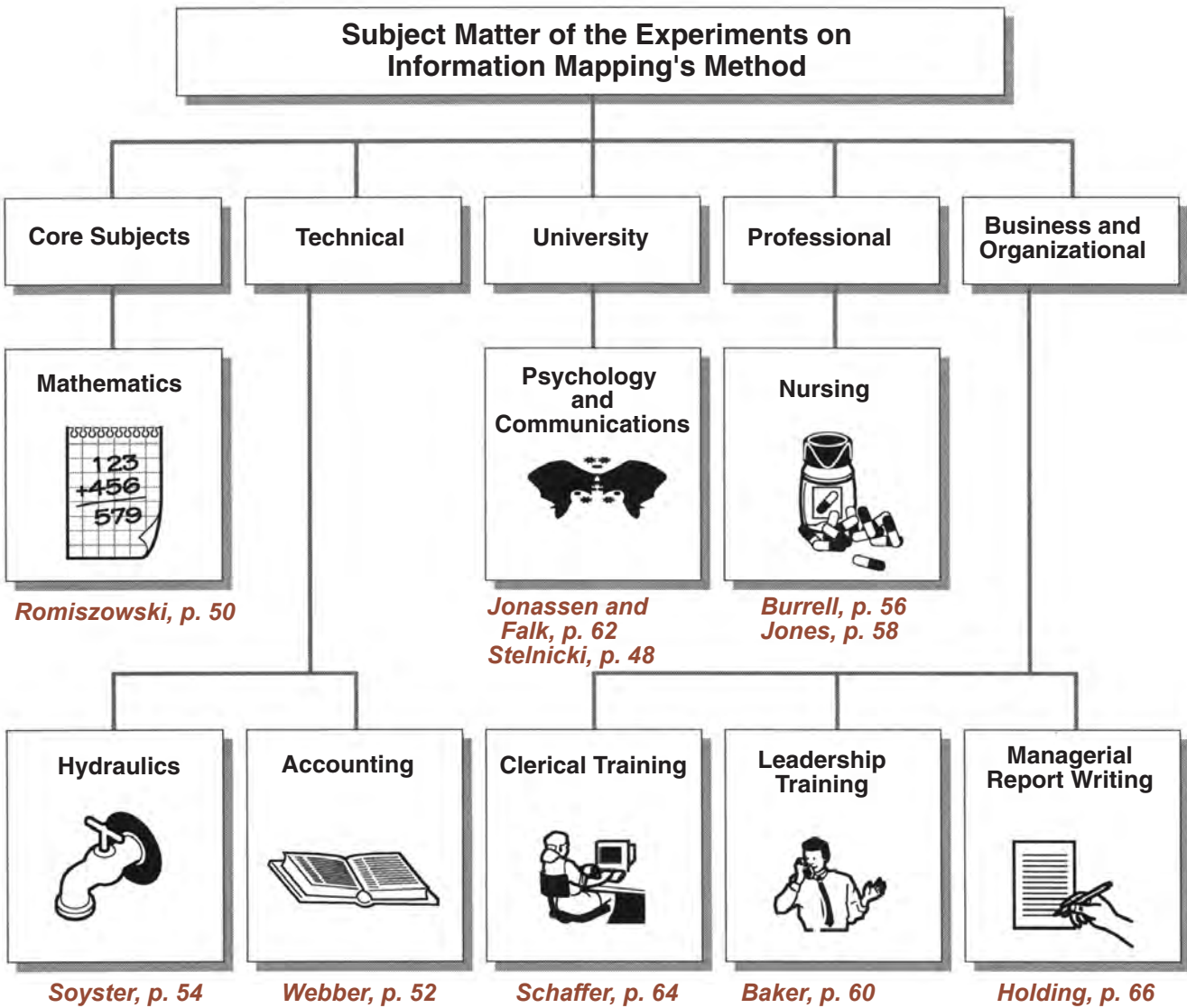
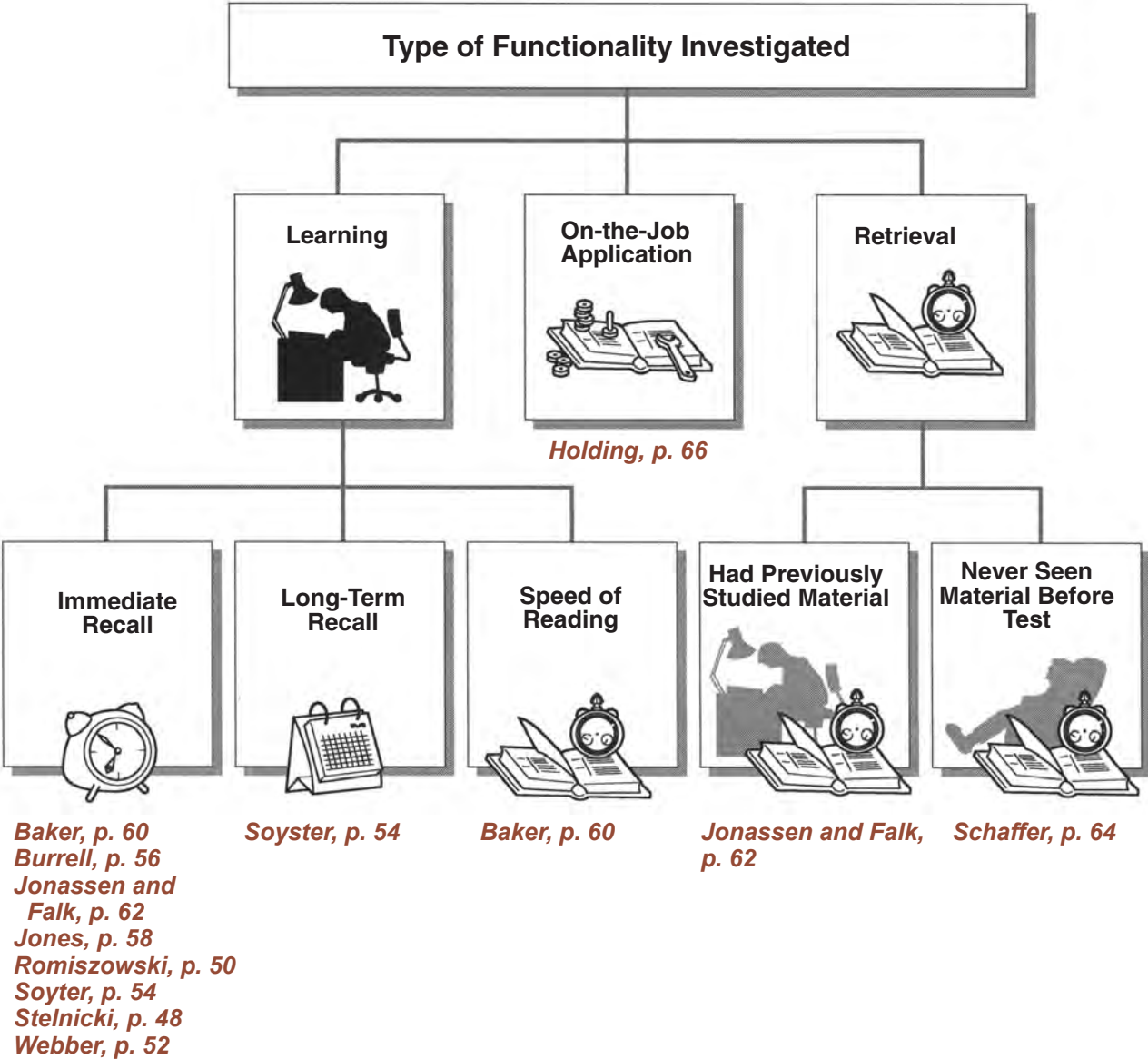
The next 4 pages present tree-like classifications of the research reports. The research is listed by author and page number along the bottoms of the charts.

The charts on these 4 pages show the results of the same studies from different points of view. A study is mentioned 2 or more times if its results apply to 2 or more factors (e.g., Soyster measured both immediate recall and long term recall, so he is mentioned twice).

Questions Answered by the Charts

These charts sort the research according to the various questions the reader might have:

- What was the researcher trying to find out?
- What kinds and levels of subject matter documents were used in the research?
- In what organizational settings was the research done?
- What level of learners or users of the documents participated in the experiments?



Overview of This Chapter, continued

Introduction

Continuing the overview of research summarized in this chapter, we look at where the research was conducted, and who the subjects were in these studies.

The research reports are referenced by the name of the investigator along the bottoms of the charts.

Here's the Actual
Order of Pages in
This Chapter:

Research Primarily Concerned with Learning

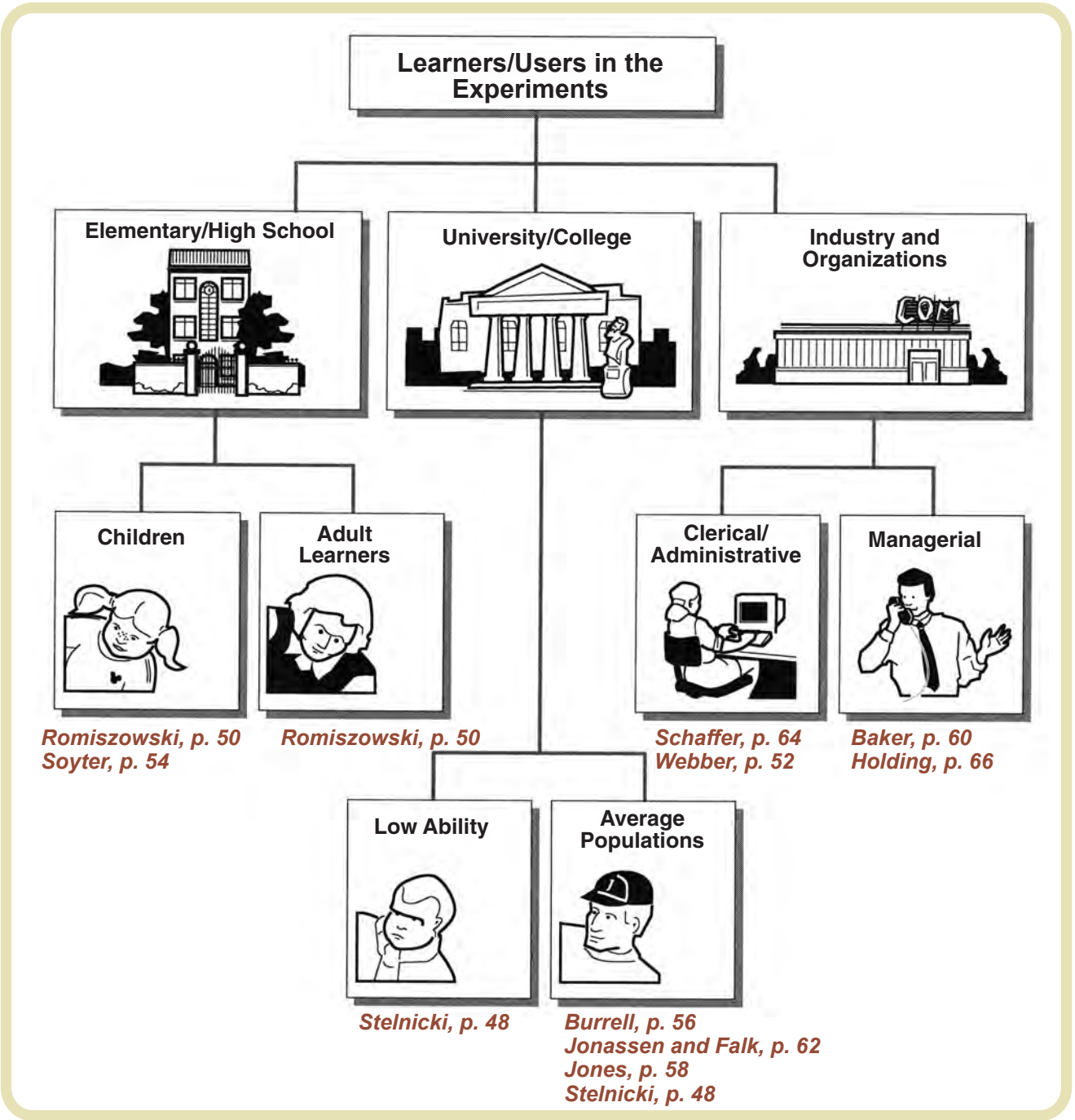
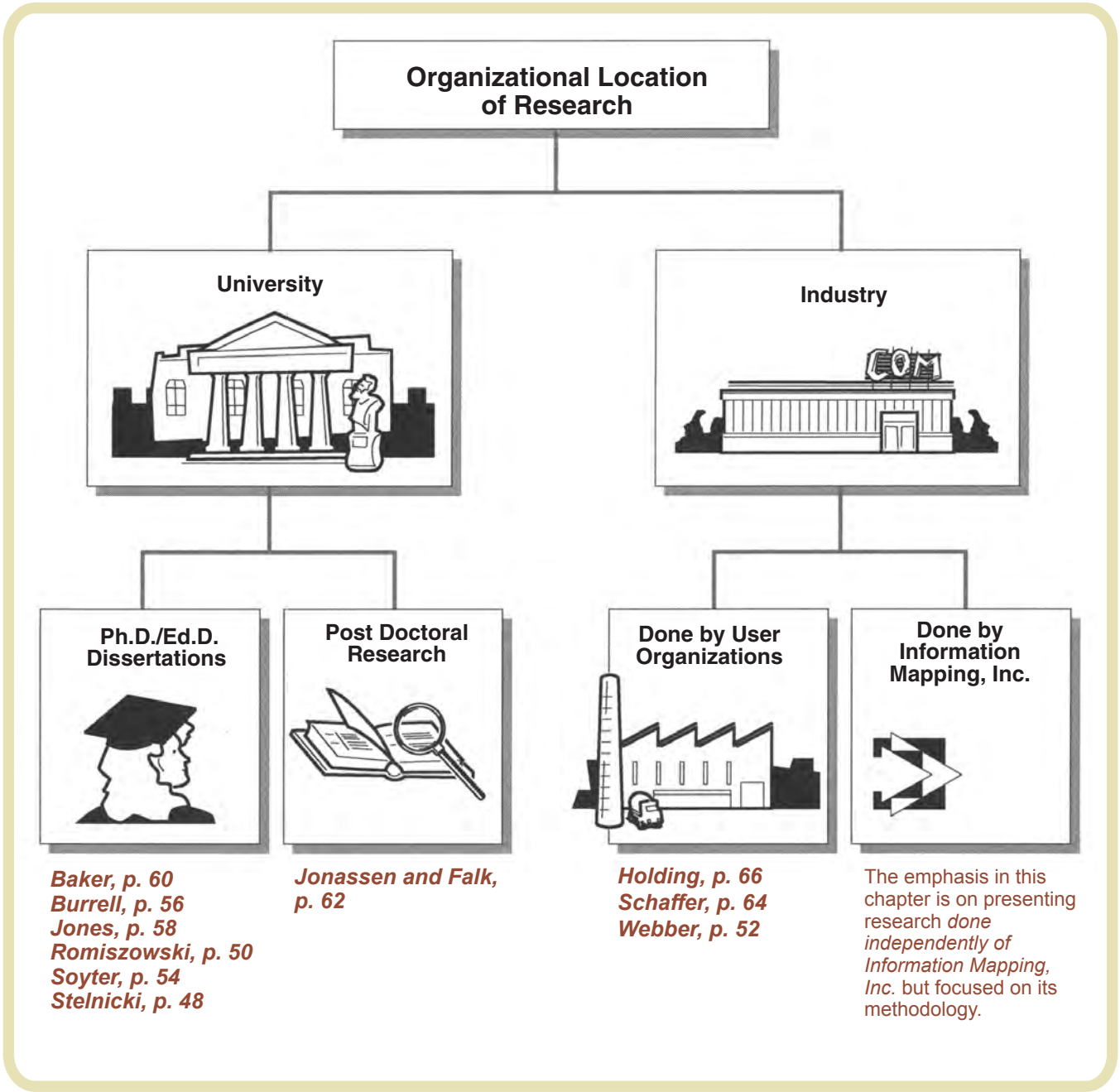
Stelnicki: Both Facts and Abstract Concepts Learned More Efficiently, 48
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Stelnicki: Both Facts and Abstract Concepts Learned More Efficiently

Problem ☐
Can college students learn both facts and abstract concepts more effectively and efficiently using material prepared with Information Mapping's structured method than they can with material in normal prose?

Materials Used ☐
The materials were designed to teach facts and concepts about Piaget's four states of cognitive development.

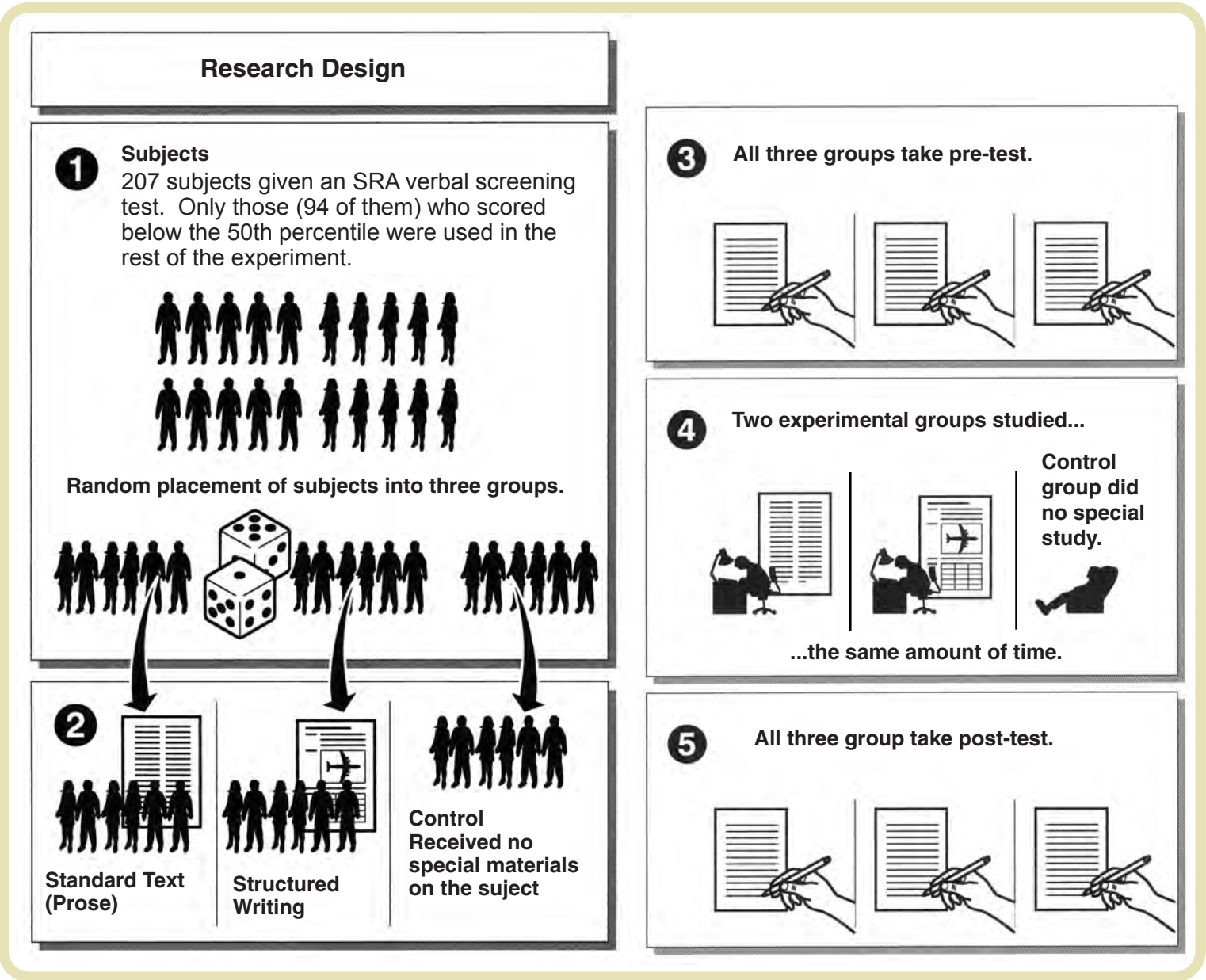
Task ☐
The administration of 2 tests, one on fact learning and one on concept learning, specifically tied to the learning materials the students studied.

Method of Presenting Task ☐
The 94 subjects were randomly divided into 3 groups:

- those who received standard texts,
- those who received structured writing, and
- those who were control subjects

Subjects ☐
There were 94 subjects at three public midwestern universities participating in the research. They were:

- 81% were female, and
- 19% were male.



The subjects

- scored at or below the 50th percentile on the SRA Verbal Form
- ranged in age from 18.3 years to 52.3 years, and
- had a mean age of 19.8 years

The subjects were in a "low general ability category" by the SRA measure.

Results ☐
Material prepared according to Information Mapping's method produces higher gain scores than the standard text.

Magnitude:
For the retention of facts, Information Mapping's method was better by 32%.
For the retention of concepts, Information Mapping's approach was better by 41%.

Significance: Yes.

Conclusions ☐
Stelnicki's research shows that structured writing containing facts produces higher gain scores than standard text. This implies that concepts generate higher gain scores than all other combinations of methods, and that structured writing is a superior method when used for teaching concepts.

Author and Affiliation ☐
Michael Stelnicki, Northern Illinois University.

Citation ☐
The Effects of Information-Mapped and Standard Text Presentations with Fact and Concept Levels of Learning on Low General Ability Adult Learner Cognition. Unpublished Ed.D. dissertation, May 1980. ☐

Romiszowski: Both Children and Adults Learn Mathematics Better in Less Time

Problem

The question asked was: Which is the better method of preparing instructional materials in mathematics for children and adults-traditional linear programmed instruction, or structured writing prepared with Information Mapping's method?

Materials Used

Two sets of booklets were prepared having:

- similar content (the content was as close to identical as possible in both)
- identical sequence
- the same examples
- nearly the same number of words.

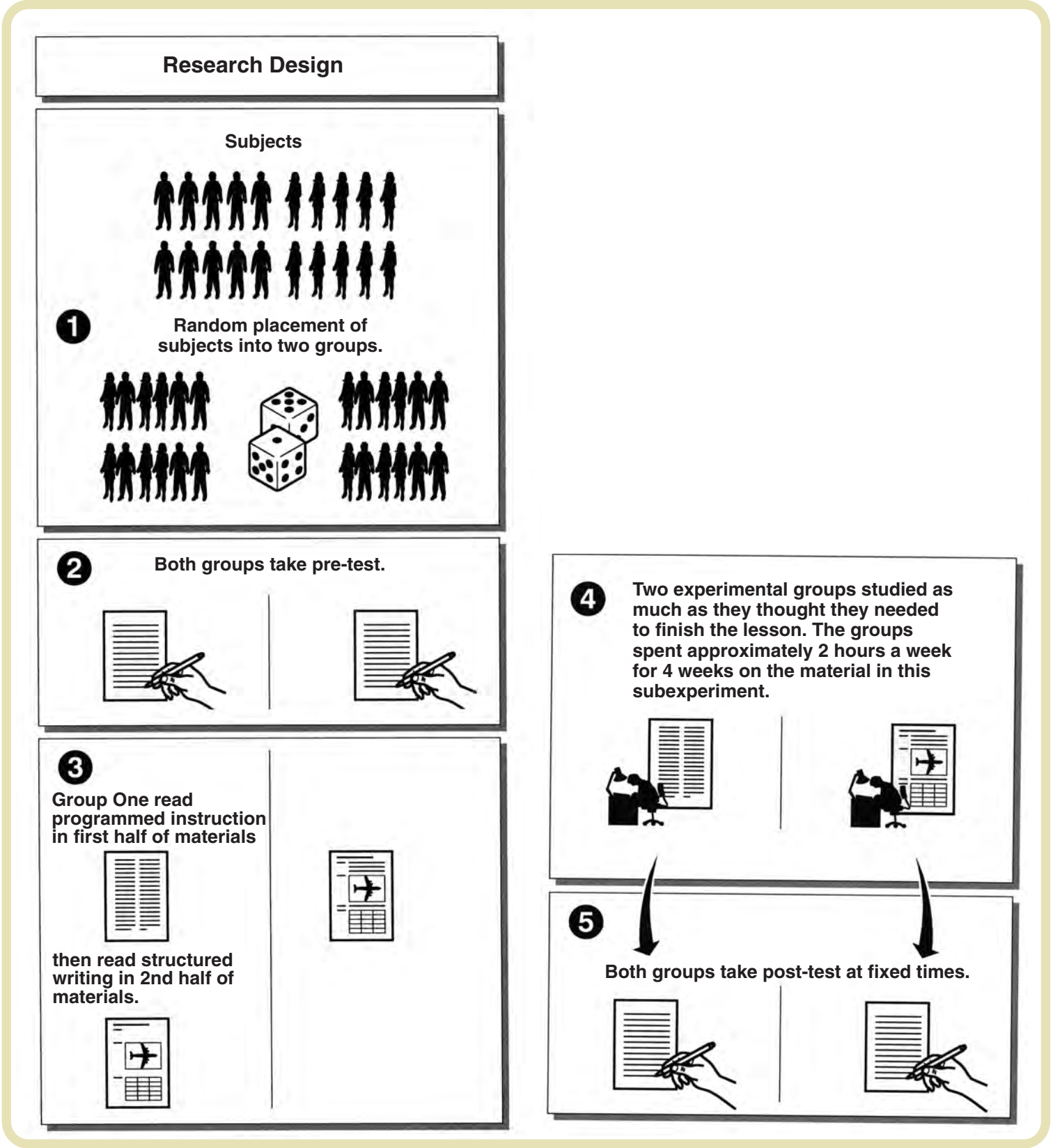
The Information Mapping version had approximately 16 maps and approximately 22 pages of feedback and practice exercises.

The programmed instruction version had approximately 25 frames "not typically Skinnerian, but rather more challenging in terms of the amount of information the frame might present." It was a "typical demonstration/practice test sequence of linear frames."

Task

A test on mathematical problem-solving of about 40 questions was used for the subexperiment. The exam tested "medium length [to] long term retention." The exams were standard tests that had been developed for the Brazilian state school system.

The experimental material was on the topic of factorization, and appeared within the context of a larger course. The investigator prepared 2 sets of instructional booklets to use during part of the course- one set in traditional, programmed instruction, and one set in Information mapping's method.



Subjects

A total of 160 children and adults in Brazil were subjects of the subexperiment:

- 15-16 year old advanced secondary students who had not studied mathematics for at least six months, and
- 20-30 year old adults who were attempting to complete high school.

Note: Some of the adults had been away from school for five to ten years.

Results

Magnitude: Both adult learners and schoolchildren learned significantly more from instructional materials written according to standards of the Information Mapping writing service and spent approximately 10% less time than students who used a programmed instruction version.

The adults, on the whole, had 11.3 percent higher scores, and the children had an average of 6.6 percent higher scores.

Significance: Yes.

Conclusion

"The results of this experiment (which was conceived as four subexperiments, each of cross-over design-2 by 2 square) were in all four cases apparently strongly in favor of the Information Mapping format, in terms of both reduced learning time and increased final test score."

Other Findings

The students performed consistently and significantly better on the parts of the test for which they used structured materials in both groups.

Students who used structured materials not only performed better on the test, but they also needed less preparation time.

Author and Affiliation

Alexander Joseph Romiszowski, Ph.D., Loughborough University of Technology (U.K.), now at Syracuse University.

Citation

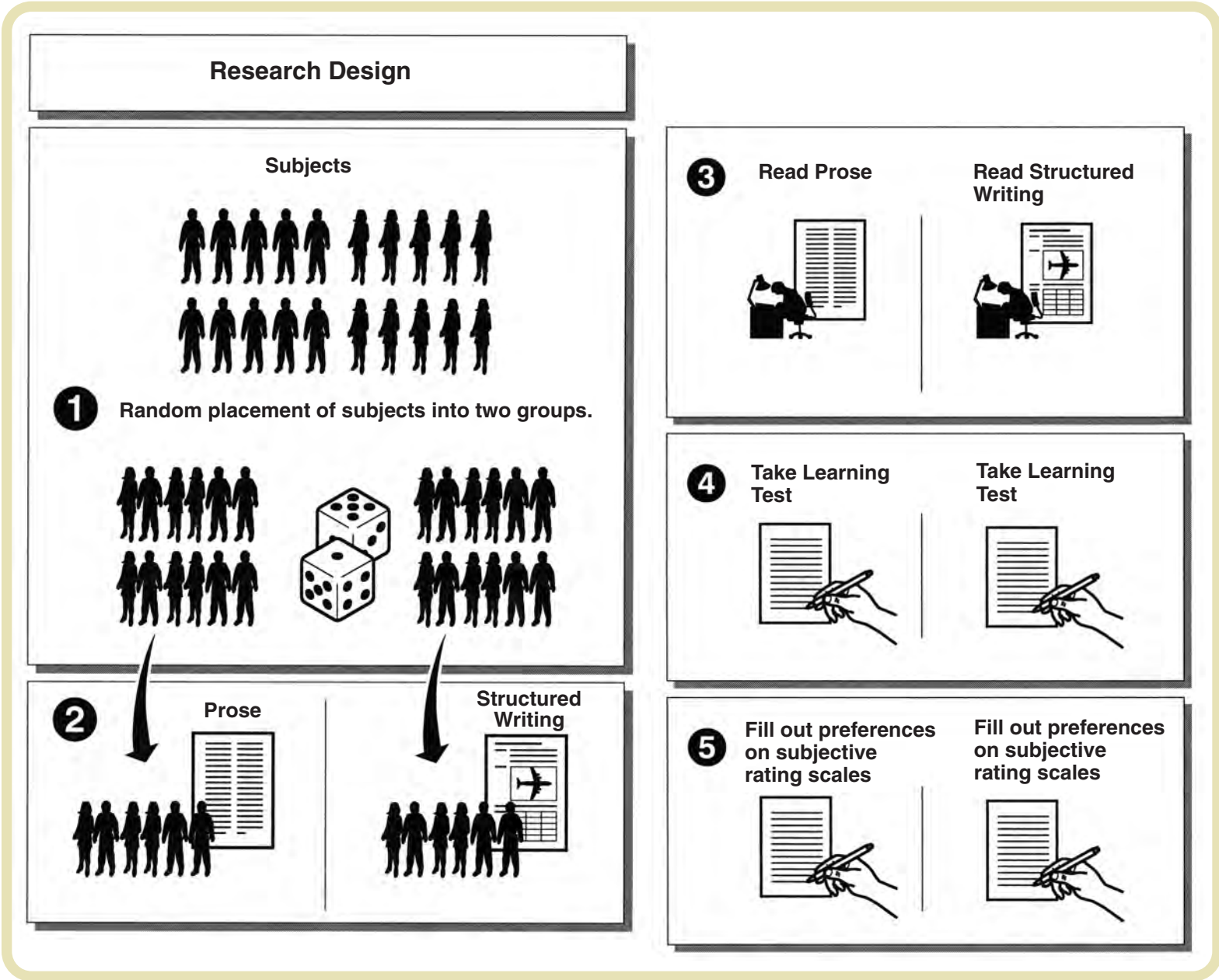
A Study of Individualized Systems for Mathematics Instruction at the Post Secondary Levels. Ph.D. dissertation, 1977, Loughborough University of Technology (U.K.).

Webber: Improves Initial Learning and Reduces Training Time by Structured Writing

Problem
Is the Information Mapping method of preparing training material better than the conventional methods?

Materials Used
A set of standard training materials and a set of materials prepared using Information Mapping's method.

Task
Functional Accounting Coding Tasks.
Subjects Administrative and clerical employees of Pacific Bell. (No further information in the report.)



Results
Magnitude:

Factors \ Treatment	Information Mapping	Standard Mapping
Lesson Test: Average Scores	95%	75%
Criterion Test: Average Scores	91%	53%
Percentage of learners achieving 88% or above accuracy in • Lessson Tests • Criterion Tests	95% 83%	30% 0%
Course Length	1 day	1 day

Significance: No test reported.

Conclusions
Initial Learning: Learners using instructional material writ- ten using Information Mapping's method scored 38% better on criterion tests as compared with a similar group using standard training material containing text and questions.

Training Time: Learners using the Information Mapping version took an average of 1 day in self-paced learning mode as compared with 2 days for the learners using standard training-a 50% improvement in training time.

Attitude: Eighty percent of the MAP learners felt the training was "fairly easy to easy" as compared with 60% of the learners with standard training.

Ninety-five percent of MAP learners felt "fairly well to well prepared and confident" at the end of training as compared with 44% of the learners using the standard training materials.

Other Findings
"The performance level back on the job has been very good. We've seen them start out on the job making 85% accuracy to start out with, and within the month they're moving up into the 90s in on-the-job performance."

Author and Affiliation
Naomi Webber, Pacific Bell.

Title
Some Results of Using the Information Mapping Writing Service Standards at Pacific Telephone Company, paper given at national conference of the National Society for Performance and Instruction,

Soyster: Better Achievement in Instruction Research Design

Problem

Does Information Mapping's method of structured writing and instructional design produce better learning and retention than a standard method of training?

Materials Used

Two versions of an instructional course on hydraulics: one using Information Mapping's method, the other using a standard method of self-instructional training delivery resembling programmed instruction.

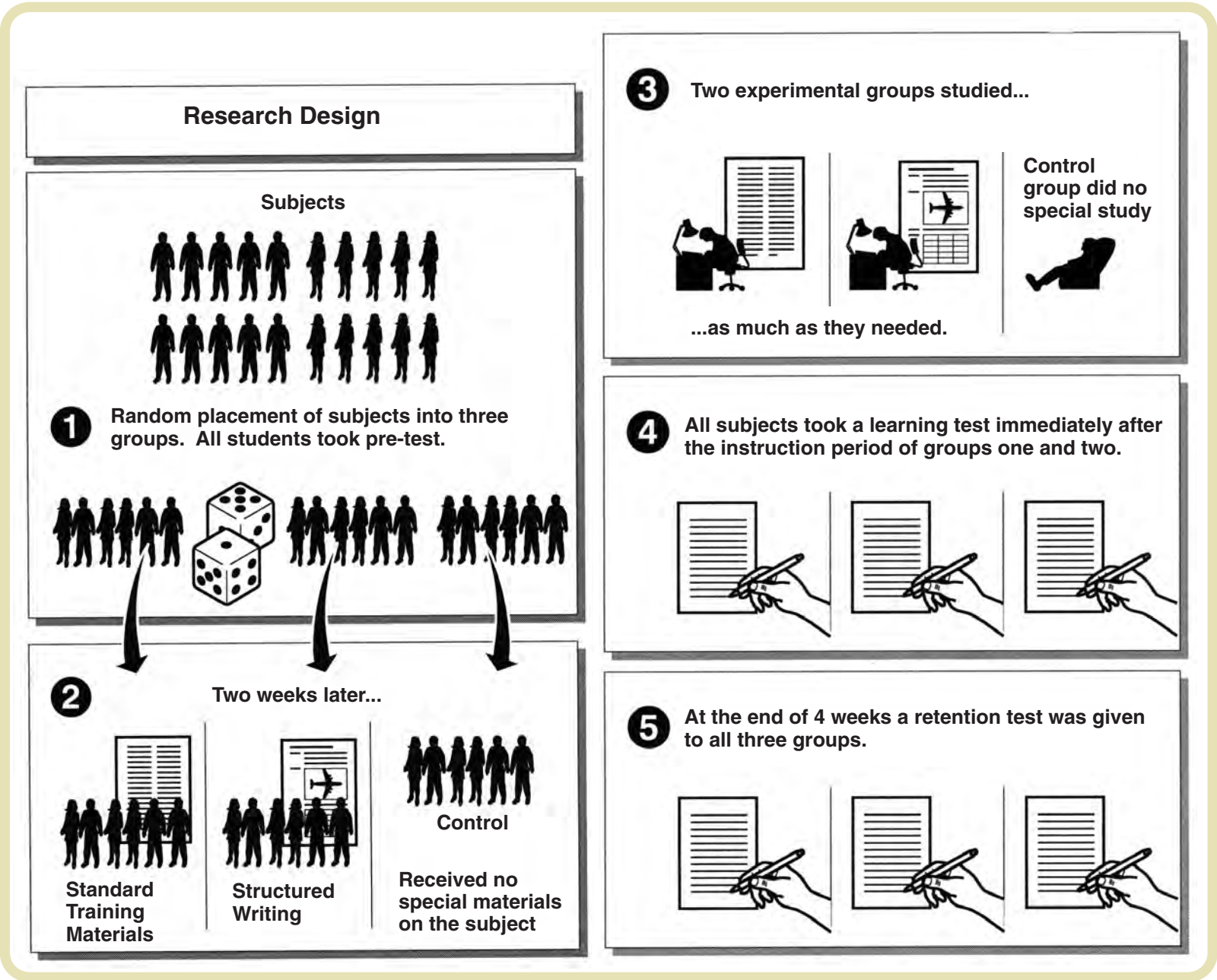
Task

Two tests were given, one testing initial learning and one testing 4-week retention

Subjects

367 ninth-grade students (194 males and 173 females).

Initial Screening: Any potential subject who scored 50% or more on a screening test on hydraulics was eliminated.



Results

Magnitude: The group using Information Mapping's method performed 13% better than the the group using the programmed instruction in the test scores.

Significance: Yes.

Other Findings

Neither auto-instructional method produced significantly higher achievement on learning or retention when considering only high or only low mental ability subjects.

Consequently, there does not appear to be an aptitude- treatment interaction between either method and high or low mental ability.

Conclusions

□ The investigation yielded these findings: Students who received instruction had significantly higher mean achievement scores than the control group when tested immediately. Students who used Information Mapping's structured writing scored significantly higher than students who used the standard training method materials when tested immediately. There was no significant difference between the students using either method when retention was tested 4 weeks after instruction. The researcher attributed this to poor motivation on the part of the learners.

Programmed instruction is effective, but texts written in structured writing produce significantly higher achievement in initial learning tests.

Author and Affiliation

□ Thomas J. Soyster, Ed.D., Temple University.

Citation

□ *A Comparison of the Effects of Programmed Instruction and the Information Mapping Method of Instructional Design on Learning and Retention of Students of Different Mental Abilities.* Ed.D. dissertation, 1980. □

Burrell: Significantly Greater Achievement in Critical Care

Problem

How well do students learn from material prepared according to Information Mapping's method compared with regular prose treatment in a self-assessment framework?

Materials Used

Critical Care Course: Nursing Roles in Crisis.

- anatomy and physiology
- synthesis of previous nursing information
- predominantly new information.

Text used: Z. L. Burrell, Jr. and L. O. Burrell, *Critical Care*, 3rd ed. St. Louis: C.V. Mosby Co., 1977.

The students used self-assessment guides written according to Information Mapping's method for one chapter of each of the 3 sets of paired chapters. They studied the other chapters without additional written instructional material.

Task

Administration of a 60-item posttest on the chapters studied.

Subjects

39 senior students at the Medical College of Georgia School of Nursing at Athens.

Results

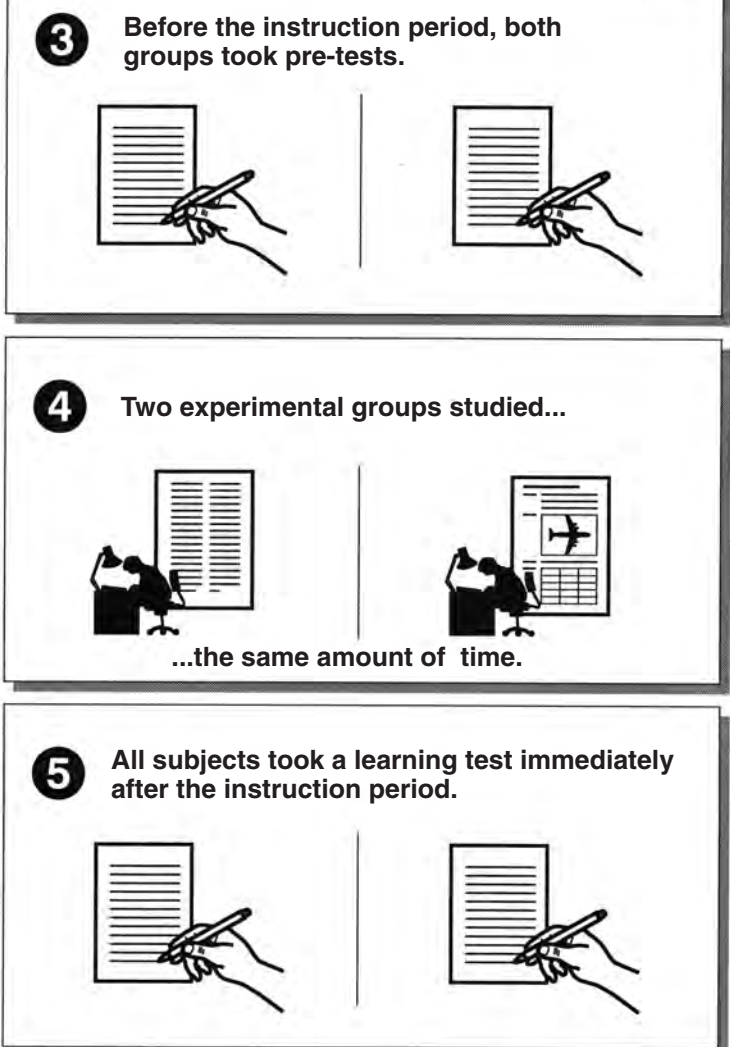
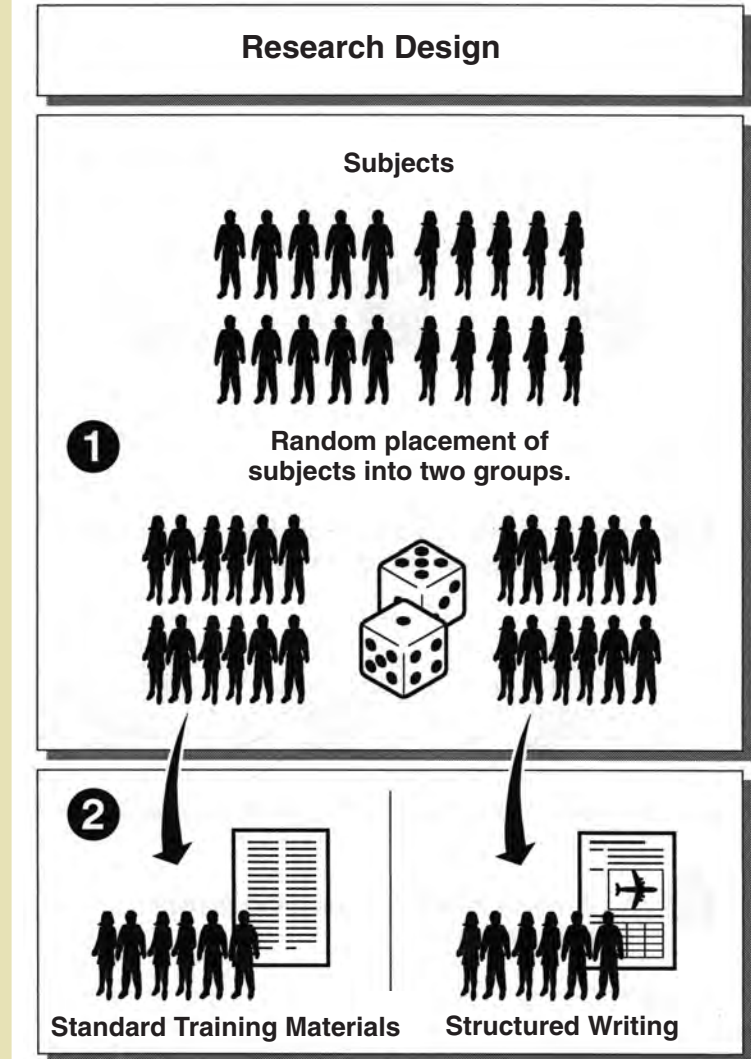
Magnitude:

The "students missed over twice as many questions without the guides when compared to the tests with the guides."

For high SAT score students, the Information Mapping version produced average scores 59% higher than the standard version.

For lower SAT score students, the Information Mapping version produced average scores 53% higher than the standard version.

Significance: Yes.



Conclusions

Students whose scores were above or below the national SAT mean scores using instructional material written according to the standards of the Information Mapping writing service showed significantly greater overall achievement than learners who did not use the instructional material.

Author and Affiliation

□ Lenette O. Burrell, R.N., Ed.D., Medical College of Georgia □ School of Nursing

Citation

Dissertation Abstracts International 1979, 39(12): 71110 A.. □

Jones: Students Achieve Greater Mastery

Problem

This study asked: (1) Does using Information Mapping's approach increase learning scores, preference ratings, and decrease study time compared with a traditional textbook? (2) Can one distinguish levels of anxiety prior to testing between groups using different versions of learning material?

Materials Used

The traditional textbook used in this course was a "well established third edition" of the Health Assessment Manual (McGraw Hill, 1986) written by the researcher. The prepublication edition of this material was used to keep the author's name anonymous so as not to influence results. A single chapter on doing a physical examination of the thorax and lungs was used in the experiment.

The Information Mapping version was produced in a special 4- column format. "[T]he first column [was] used for verbal presentation. Within this column, concepts and definitions of specific aspects of the examination (e.g., the definition of respiration) were presented; the process (e.g., the function of a particular body part) was discussed; and the related procedures (e.g., the step by step process involved in examining the heart) were explained. Visuals were presented in columns 2 and 3 and specifically designed to interface with the narrative prose and reflected the objectives of the information block under discussion. . . . visual designs were created in relation to the overall model of the text and incorporating multiple cuing strategies. . . . the fourth column was devoted to . . . reviewing. Within this column, verbal and visual information was reviewed from the three preceding columns and highlighted, so as to reinforce both narrative and visual information, thought to be important."

Schematic of Experimental Material Used

NARRATIVE	PHOTO	ANATOMY Overlay of Photo	HIGHLIGHT
		 Chest	
		 Lungs	

Task

Three test measures were used:

Competency Based Assessment Tool (CBAT) consisting of 50 multiple choice and short answer items. Approximately 50% of these questions contained a graphic element.

Assessment Textbook Preference Rating Scale (ATPRS) to determine student preferences for traditional and experimental textbooks treatments.

State-Trait Anxiety Inventory (STAI) used to measure level of student anxiety immediately prior to testing of the homework reading assignment.

Subjects

The subjects were 70 full-time students at three university nursing schools enrolled in their first nursing course. Ages 18 to 31, with a mean age of 20.16 years.

Participation in the experiment was voluntary and did not affect students' grades.

Results

Magnitude: "The results of this investigation further demonstrated that in comparison to the traditional text format, students from all three academic settings who studied from the interactive information mapped text received significantly higher scores on the test of mastery, had significantly higher scores on the text book preference rating scale, and increased their study time."

Learning: The group of students who used the Information Mapping version scored approximately 22% higher in the competency test.

Preference: The students who used the Information Mapping version gave significantly higher ratings to their material over the ratings provided by the traditional textbook group.

Anxiety: There was no significant difference in anxiety immediately preceding the taking of the mastery test. The author attributes this to the fact that the results of the experiment did not influence student grades.

Learning Time: "[S]tudents who studied from the mapped text (60 minutes or less) received higher mastery scores than did students studying from the traditional text (for more than 60 minutes). Students who studied the mapped text for more than 60 minutes received higher scores than those studying the mapped format less than 60 minutes. All student studying from the information mapped text, regardless of study time, had significantly higher scores on the tests of mastery."

Significance: Yes.

Conclusions

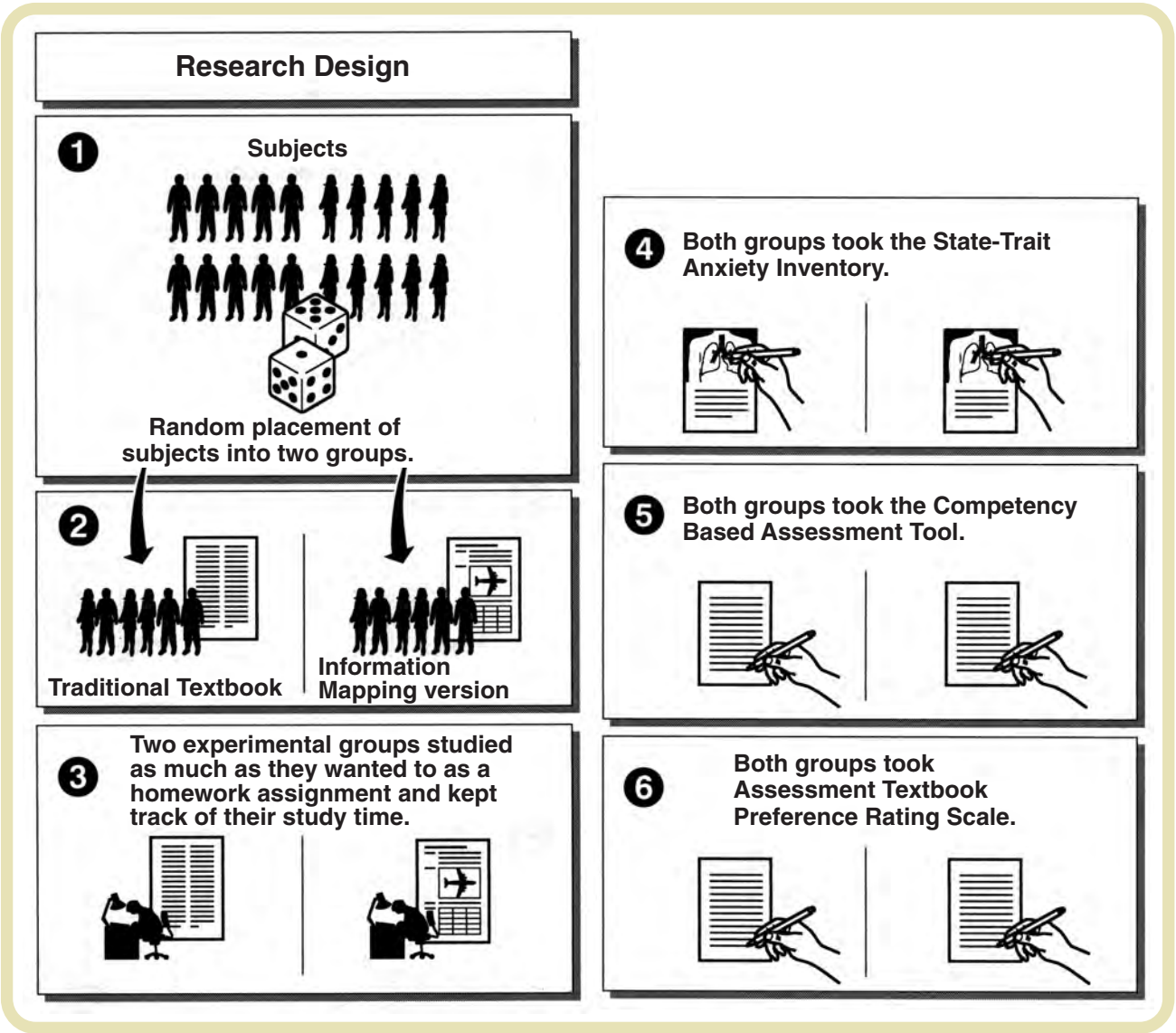
These findings support the hypothesis that materials prepared according to Information Mapping's approach "(1) resulted in significantly higher scores on test of mastery; (2) [were] significantly preferred over other text formats presenting similar content; (3) [were] read longer than the traditional format; and (4) increased study time, which significantly influenced mastery scores. . . . In addition, reactions to the interactive information mapped format tended to be more positive and consistent, had greater depth, and contained more individual reactions to the text format."

Author and Affiliation

D. A. Jones, Ed.D., R.N., C., F.A.S.N., Boston University, now at Boston College School of Nursing.

Citation

The Effects of an Interactive Information Mapped Textbook on Mastery Learning of Physical Examination and State Anxiety of Undergraduate Nursing Students, Boston University, Ed.D. dissertation, 1986.



Baker: Effects of Recall and Speed of Reading

Problem

How does Information Mapping compare with prose and with prose augmented with advanced organizing information in speed of reading and immediate recall?

Materials Used

There were 3 texts used by the 3 groups in the study:

- *Prose*. A text 24 pages long used to train soldiers in the U. S. Army in leadership. It contained a "liberal application of such aids as the use of major topic headings, the insertion of section summaries, and conclusions, and underlining key words."

- *Prose-with-Advance-Organizer*. This version contained the prose version with an advance organizer treatment at the very front of the text. The advance organizer was approximately one page long.

- *Information Mapping version* which contained the same number of pages as the prose version (24 pages).

Task

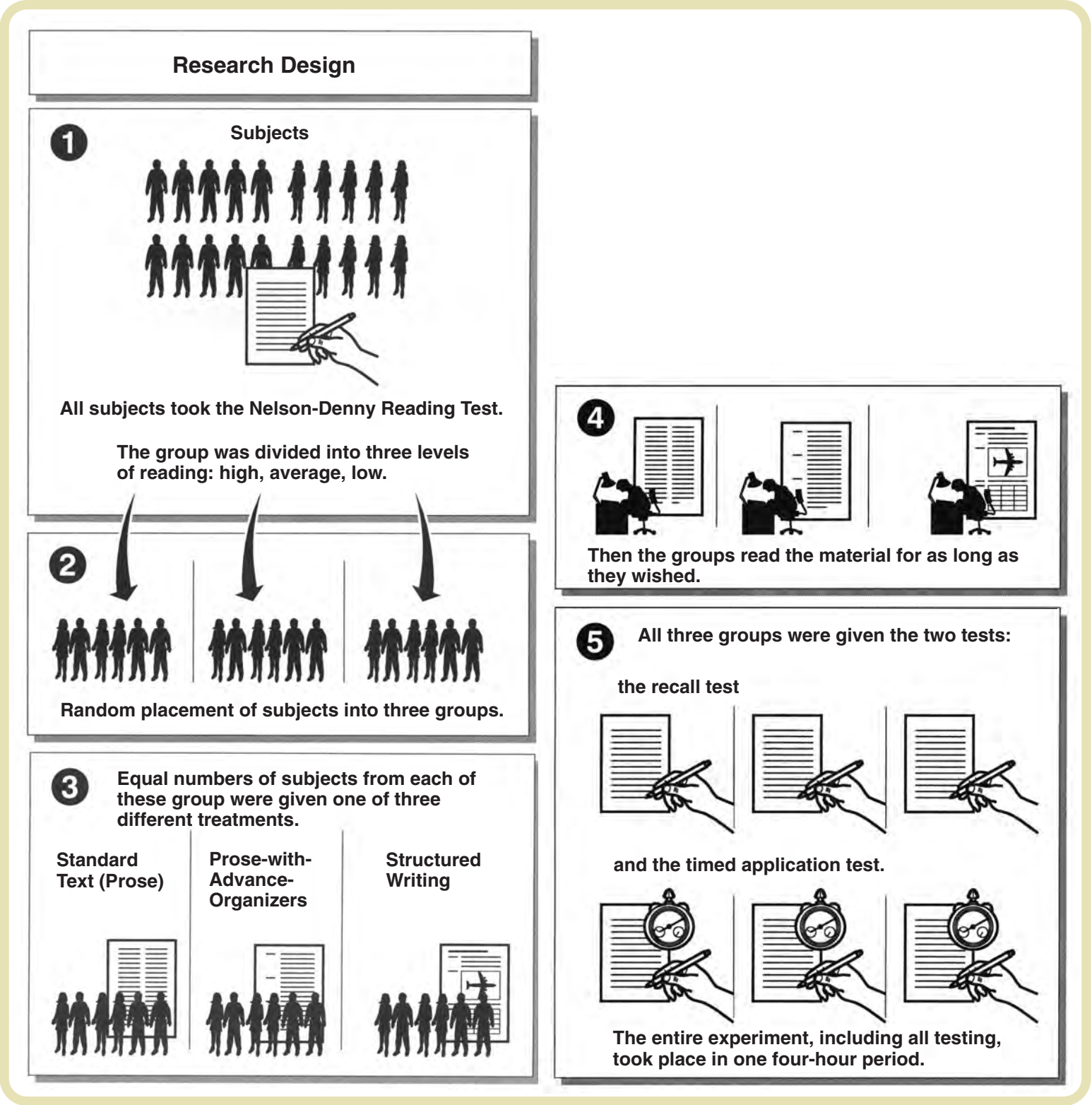
Reading test. The subjects were divided into 3 reading ability groups: high, average, and low, based upon the results of the reading comprehension portion of the Nelson-Denny reading test.

Two post-tests were administered during the sessions:

- a multiple choice recall examination consisting of 33 questions scored on accuracy
- an application examination containing multiple choice questions scored on the basis of time.

Subjects

335 junior officers (266 male and 69 female), primarily second lieutenants, attending Signal Officer Basic Course at Fort Gordon. Ninety-five percent of the officers had previously graduated from colleges and universities.



Results

Magnitude: The three groups did not differ significantly on the scores on either of the tests.

The Information Mapping group did, however, have significantly lower reading times. □

1. The Information Mapping group read 12% faster than the advanced organizer or prose group in the high ability reading group.

2. In the average reading level group, the Information Mapping group read 18% faster than the advanced organizer group and 20% faster than the prose group.

3. In the low reading ability level group the Information Mapping version produced 16% faster reading than the advanced organizer group and 21% faster reading than the prose group.

Significance: Yes.

Conclusions

The research showed that subjects who read a text using Information Mapping's method significantly outperformed the subjects who read the prose and prose-with-advanced organizer versions. Subjects in the high reading ability group also significantly outperformed the lower ability readers in reading time, recall scores, and application time.

Author and Affiliation

Edward Isaac Baker, University of Georgia, Athens.

Citation

Effects of Variations in Text Designs and Reading Competency on the Immediate Recall and Application by Army Lieutenants Attending the Signal Officer Basic Course, Ed.D. dissertation, 1988. □

Jonassen and Falk: Provides Significantly Better Retrieval

Problem

Are materials prepared according to Information Mapping's method better than programmed learning materials for retrieval of information?

Materials Used

Two versions of self-study materials were developed for this experiment from a 2,000-word prose passage, "Communication and the Teaching Process":

Standard Training Method. One version was a 20-page programmed learning text containing 40 frames "of a paragraph or less, and multiple choice questions were inserted after each unit with knowledge of results presented immediately below the frame on which the student was working." Two illustrations (apparently diagrams of the communication process) were put at the end.

Structured Writing Materials. The version prepared according to Information Mapping's method was a 19-page document which contained 18 information maps, 55 blocks, and the same two illustrations.

Our understanding is that there was active response in both versions.

Task

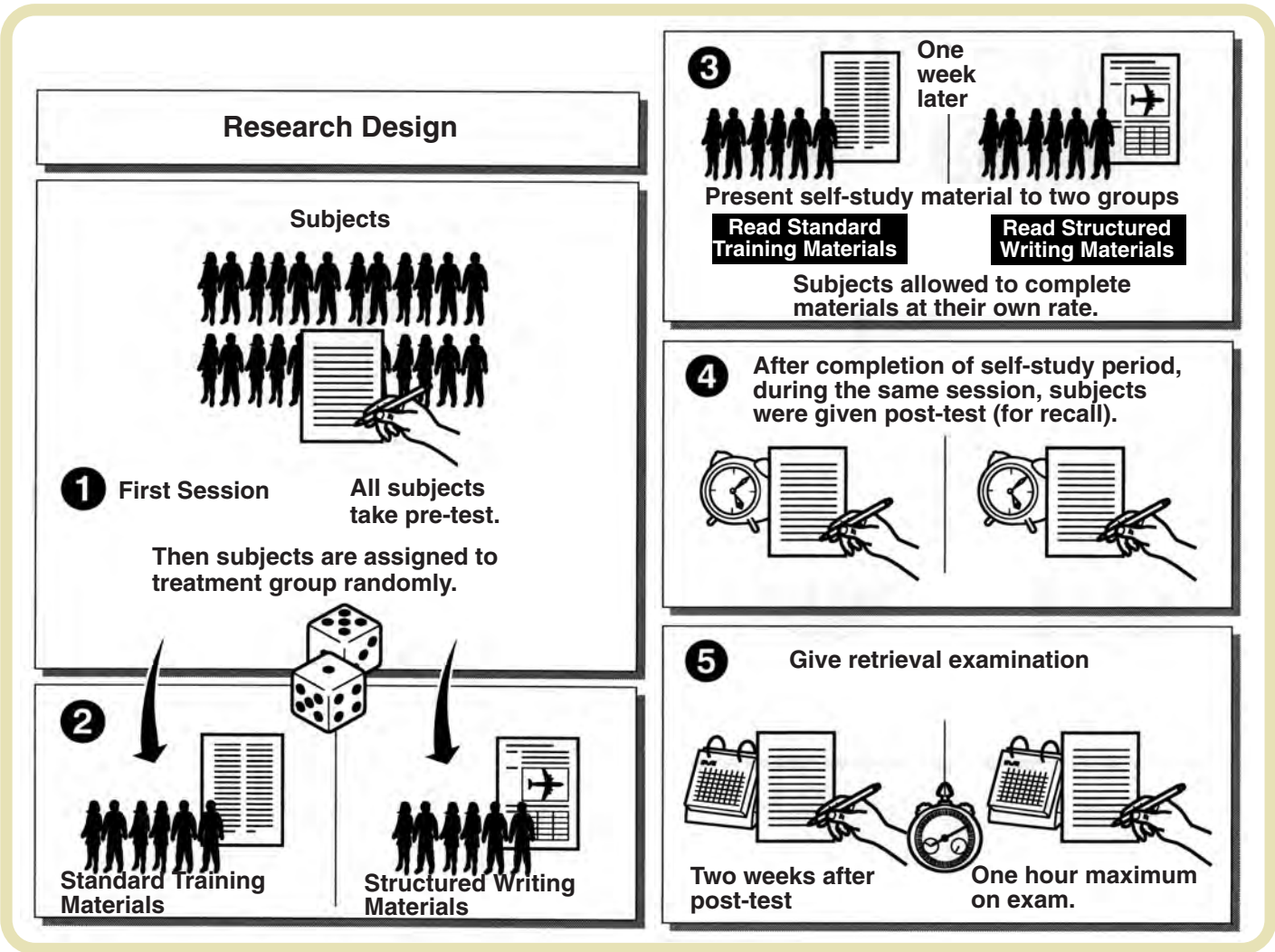
Pretest /Posttest. (for recall):

- 41 test items
- 4-option multiple choice
- test items extracted verbatim from text
- reviewed for validity by panel of subject matter experts.

Reliability for this exam was established by administering it to a separate group of subjects.

Retrieval Test. (for speed and accuracy of lookup):

- open book tasks
- 45 fill-in-the-blank questions using stems from the pretest-posttest exam
- students were required to write the page number on which information was located
- test administered 2 weeks after the posttest.



Subjects

41 seniors and graduate students in two sections of an introductory media course.

Subjects were divided into two unequal groups:

- 22 used structured writing, and
- 19 used standard writing

Results

Magnitude:

Retrieval. Students using the structured writing version of the materials were 32% more accurate than those using the standard training material. Results were measured in terms of "the total number of correct answers that could be located within one hour."

Initial Learning. The two methods (standard and structured writing) both provided approximately equal initial learning when presented in a self-paced mode.

Significance: Yes.

Conclusions

The structured writing version provided significantly better retrieval of information than the standard training materials. "The structural characteristics of [the Information Mapping version] provide a clear advantage for retrieving information from textual materials," wrote the authors. "This study has proven that Information Mapping is an effective alternative means for enhancing print-oriented textual materials. The instructional effectiveness of mapping has been documented in a variety of settings, including industrial and business training, the military, in the university, and at technical institutes ...The clearest mandate produced by this study is for the use of information mapping techniques in the construction of reference tools."

Author and Affiliation

David H. Jonassen, School of Education, University of North Carolina at Greensboro, and Lawrence Falk, Insurance Company of North America.

Citation

Mapping and Programming Textual Materials, *Programmed Learning and Educational Technology*, 1 (1), February 1980: 20-26.

This research has also been reported in: D. H. Jonassen, *Recall and Retrieval from Mapped and Programmed Text*, paper presented at the AECT Convention, New Orleans, Feb. 1979; and in D. H. Jonassen, *Information Mapping: A Description, Rationale and Comparison with Programmed Instruction*, *Visible Language*, 1981 15(1): 55-66.□

Schaffer: Better Reference-Based Training

Problem

Which is better in a reference-based instruction situation in which the learner has to look up answers in a reference book: Information Mapping's method or standard text?

Materials Used

The **original version** of a 140-page Time Reporting Manual.

"The selection was based upon the high quality of the existing document, its technical complexity, and the size of the user population. The current version has few errors in content and an exceptionally clear writing style. Also, the widespread use of the instruction multiplies the importance of the human performance characteristics of the document."

Information Mapping Version. One hundred eighty-five-page revised version developed by Information Mapping, Inc.

Tasks

Retrieval and Application Tasks. "The tasks were generated by randomly selecting time reporting deviation codes from a pool of codes that are not generally known. The selected codes were then inserted at random into one of 2 formats. One question format involved the determination of a code's meaning using a multiple choice presentation. The other question format involved the determination of the appropriate code for a given situation. After each item a space was provided for the subject to record the time. In this way, 2 equivalent sets of tasks were developed, each containing 3 multiple choice items followed by 3 code determination items."

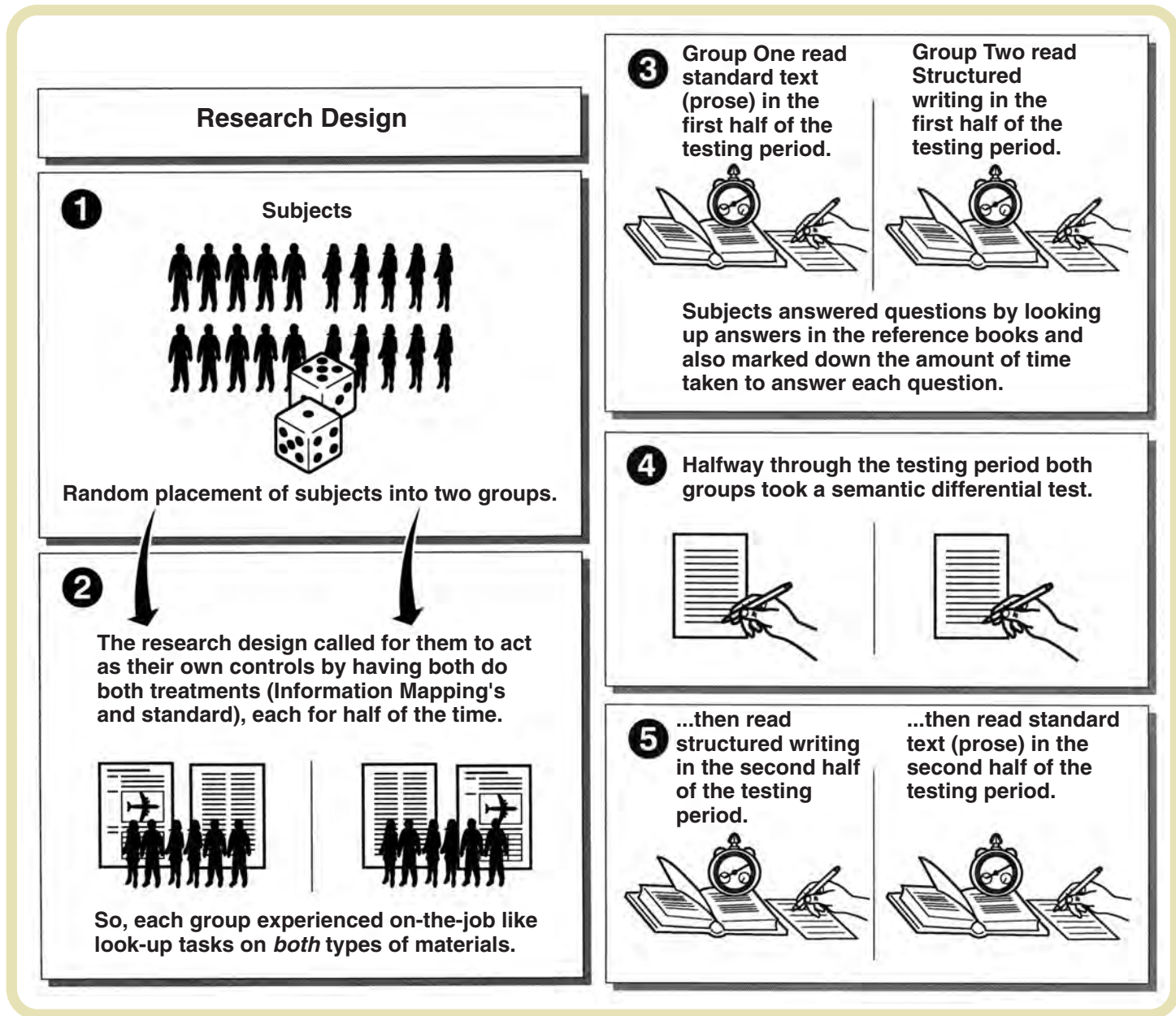
Semantic Differential. A pre- and post-semantic differential evaluation form was provided to subjects to assess perception of task format and feelings about the material.

Subjects

Ten subjects: 7 female, 3 male.
Average Age: 38.6.
Job Type: 5 clerical, 4 management.
Average Length of Employment: 10.2 years.
Knowledge of Tasks: Subjects were screened to prevent inclusion of individuals familiar with the specific time reporting instruction tested on IM.

Analysis

Time and error data compiled. Semantic differential scaled on 1–7 scale.



Results

Magnitude:

Time. The version "had no significant effect on the time required to complete the tasks."

Errors. "Subjects made 54.5% fewer errors in the tasks when using the Information Mapping version of the instruction."

Significance: Yes.

Subjectivity rating: "The Information Mapping version was reported to be more 'modern,' 'clear,' 'not frustrating,' 'friendly,' and 'good.'"

"Of the 25 items on the final evaluation instrument, 12 revealed significant differences between the versions of the instruction □ (P < .05)."

The Information Mapping version was described as follows:

- text rambles less
- divided into more logical parts
- table of contents easier to use
- type font not "too small"
- more "trustworthy" and "friendly"
- made subject feel more "satisfied," "confident," and • "in control"
- "easier to use"
- "easier to learn from"
- more of a "good, quick reference."

Conclusions

"Although the current version is generally considered by management to be in 'good shape,' the Information Mapping version was significantly superior. Although the scope of the study is limited, the importance of writing quality is clearly demonstrated."

Author

Eric M. Schaffer.

Citation

The Potential Benefits of the Information Mapping Technique, NSPI Journal, 1982 (February): 34–38.

Comment: Size of Task

Rarely do studies use reference and training materials of such a large size as those used in this study. This, together with the closeness of the experimental situation with on-the-job use of similar materials, makes this an especially significant study.

Also relevant here is the concept of reference-based instruction for training and on-the-job reference materials. -REH□

Holding: Improves Writing of Business Reports

Problem

Did the Information Mapping method of preparing business reports and the course for teaching the method improve the writing skills of managers to such a point that it resulted in improved communication? Did the course reduce the time it takes managers to write memos and reports to such a point that it created time/cost savings for Pacific Bell?

Materials Used

R. E. Horn, Training Course Material for Effective Reports, Proposals, and Memos, taught in a 3-day format by Pacific Bell instructors certified to teach the course by Information Mapping, Inc., Waltham, MA.

Task

Writing reports in an ongoing business setting after the course. Thus, the evaluation measured skills used on the job after training.

Subjects

One hundred eighty first level managers of Pacific Bell.

Results

Magnitude:

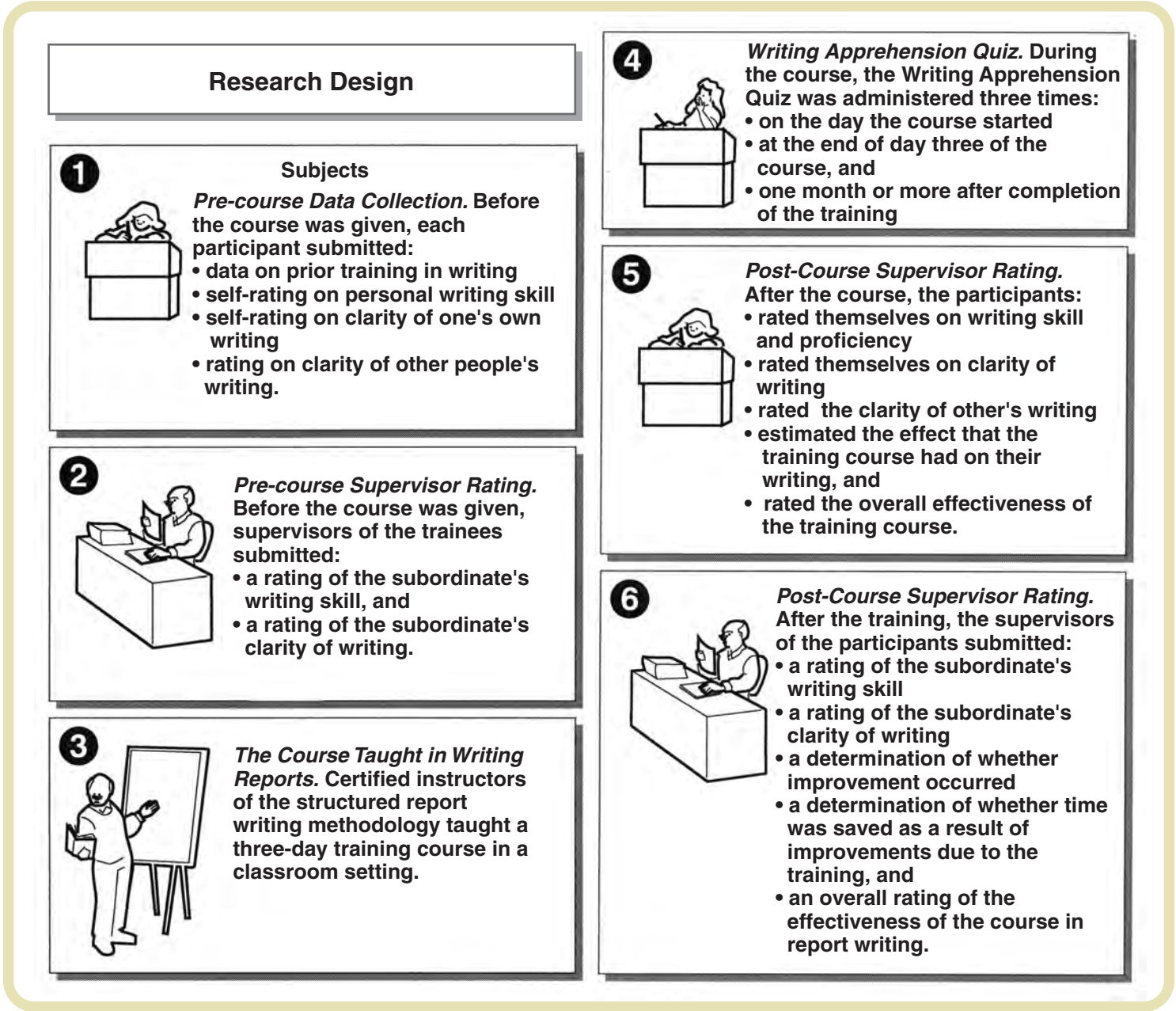
Decrease in Reading Time. All of the supervisors surveyed state that the amount of time it takes to read a document, using the method taught in the course, has decreased. The mean decrease in the amount of time was 32% and ranged from 10 to 50%

Improvement of Writing Skills as Rated by Supervisors. Before the course, supervisors rated the skill of the subordinates who took the course on a 7-point scale at a mean of 4.09; after the training, they achieved a mean rating of 6.00. These improvements in skill and similar separate ratings in clarity were attributed to the training course by all (100%) of the supervisors.

Increase in Report Writing Speed. Supervisors indicated that the writing productivity of the subordinates increased.

Improvement in Analytical and Organizing Skills. All of the supervisors also said that the course improved the analytical and organizing skills of the attendees.

Significance: Not reported.



Other Findings

Speeds up Organizational Processes. Eighty-three percent of the supervisors reported faster approval rates due to the methods used in the course.

Subjective Impression of Writing Faster and Saving Time. Eighty-six percent of the first level managers who took the courses reported that the training either saved some or much time in writing letters, and 84.8% thought that it saved time writing reports. Thus, they agreed with their supervisors in this productivity measure.

Completed Report Writing Before Deadlines. The attendees also generally confirmed their supervisor's impressions that they wrote their required letters and memos before deadlines, suggesting that the course did have a positive effect on their writing behavior.

Perceived Increase in Skill. Participants perceived a significant increase in their skill that was directly related to the methodology taught in the course. The correlation between the ratings that participants gave themselves and those given by the supervisors was high. There was a corresponding correlation to the ratings that participants and supervisors gave in improved clarity of writing. A separate inspection of the prior training that participants had in writing revealed that this did not affect the ratings on perceived proficiency.

More Complete Analysis. Analysis of the data also showed that communication written using the method is more complete than that written in the traditional way, substantiating claims made by the developers of the method and course.

High Effectiveness Rating to Course. The overall ratings given by the supervisors to the course were:

- very effective, 63.0%
- effective, 29.6%
- somewhat effective, 7.4%
- not effective, 0%

Author and Affiliation

Eva Holding, Pacific Bell.

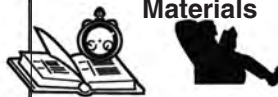
Citation

An Evaluation of the Effectiveness of the Information Mapping® Methodology and "Effective Reports, Proposals and Memos." San Francisco, CA. Pacific Bell, Oct. 1985. □ □

Summary

Introduction

The reader who has examined the results of the studies summarized in the two chapters will conclude that there are a variety of different ways to look at the quantitative benefits of using Information Mapping's method. On these pages we summarize the results from this chapter.

	Measured by Number Right or Number of Errors	Time to Do Task	Supervisor Appraisal
Initial Learning  Immediate Recall	STELNICKI: 32% higher scores on facts; 41% higher on concepts SOYSTER: 13% higher scores ROMISZOWSKI: 10% higher scores BURRELL: 53-59% better on tests WEBBER: 38% higher scores on the criterion texts	ROMISZOWSKI: 10% faster WEBBER: IM version was 50% faster	
Long Term Recall 	SOYSTER: No difference (attributed to motivation factors by the researcher) WEBBER: IM version provided 85% or better accuracy when starting on the job		
Retrieval Had Previously Used the Materials 	JONASSEN AND FALK: 33% higher scores with IM	BAKER: IM had 12-21% better reading speed	
Had Never Seen the Materials Before 	SCHAFFER: 54.5 fewer errors with IM		
On-the-Job Application 		HOLDING: Supervisors reported 32% decrease in reading time for persons receiving reports written in IM. 84% of IM users report increase in writing speed after taking course	HOLDING: Supervisors reported 100% of those who received training had productivity increase. Course was rated: • very effective 63% • effective 30% • somewhat effective 7%

KEY
IM = Information Mapping's method

*The Soyster results on long-term recall may reflect nothing more than what much research has shown about memory, i.e., that human beings forget at a rapid and constant rate no matter how they learn. The only exception to this general condition is that people remember material they use frequently or that they learn to a level of fluency. Soyster's subjects learned to a "just barely can do" level and did not use the material in the intervening time. (For this reason, we recommend the use of "reference-based training," that is, training based on the immediate recall and retrieval properties of Information Mapping's method. Reference-based training is also sometimes referred to as "just-in-time training.")

notes

Chapter 1. Evaluating the Method

2. Overview of Research Results. For a comprehensive look at evaluation in an industrial training situation see Smith, 1980.

6. Effectiveness: Does It Work at All? For a description of this research, see Horn et al., 1969. Other researchers who have done effectiveness research are Cheung (1980), Fields (1982), Reid (1984), Mcclung (1985), and Olivares-Guerrero (1985).

8. Comparative Effectiveness: How Does It Work Compared to Other Approaches? Research mentioned includes Stelnicki (1980), Jonassen and Falk (1980), Romiszowski (1977), and Soyster (1980). Descriptions in the text in this and following pages may be located in the References section under the name of the researcher.

10. Business Effectiveness: How Well Does It Work in Real-World Business Situations? Studies referred to are Webber (1979), Shaffer (1982) and Sherman (personal communication).

12. User Acceptance: Do Users Like It and Use It? "Test in Statistics Class" see Horn et al., 1969. Pacific Bell anecdote (personal communication).

14. Teaching Effectiveness: Can You Teach It to Others Consistently? Data from reports of instructors from Infor- mation Mapping, Inc., and from Pacific Bell, AT&T, Boeing, DEC, and Canada Bell. "Romiszowski and Horn Report," both of the matrix algebra manuals are unpublished manuscripts. See Horn, 1985, for another account of the same data.

16. What Other Operating Characteristics Do You Find? Quotes are from Bixler, 1979.

18. Does It Work under Difficult Conditions? All of the data from Information Mapping's clients. "One of the largest real world situations ..." and "One of the Largest Personnel Manuals ..."; unfortunately, I can't cite more information because of non-disclosure conditions.

20. Scaling Up and Scaling Down: Does It Work on Large as well as Small Projects? Data from Information Mapping, Inc. survey (unpublished data).

22. Does It Work in Very Constrained Situations? "Some Typical Applications of Information Mapping's Methodology to Online Text." Data from survey of Information Mapping, Inc. project managers (unpublished data).

26. Does It Work in Special Training Situations? These 2 pages are based on an article by David Grebow and Robert E. Horn, "How Training Helped Wells Fargo Sell a New Service." Available from Information Mapping, Inc.

28. Besides All That Efficiency and Effectiveness, Can You Provide an Attractive and Comfortable Journey? Example 3 from Horn, 1989 (used with permission).

30. Does It Increase Productivity? Data from La Boissier (personal communication).

32. Is It Cost-Effective for Its Mission? Information Mapping has a publication that helps you estimate costs and benefits. Ask for *The Bottom Line*.

36. Can You Measure Critical Variables in Its Components? The relative numbers of examples and definitions are exemplary. Each subject matter would have slightly different measurements.

Chapter 2. Research on Information Mapping's Method

General note on Magnitude and Significance. The reader who has examined the References will note that we have included blocks on magnitude and significance for each research report. Under magnitude, we report the size of the differences noted. Under significance, we indicate whether the researcher reported statistical significance for his/her findings. Statistical significance is concerned with whether the difference found in the research is reliable. Even a small magnitude (difference) may be reliable, while a seemingly large difference may sometimes not be reliable (i.e., statistically significant). In most research the minimal level of significance is .05 meaning that not more than 5 times in a hundred would these results occur by chance.

44. Overview of this Chapter: Abstracts of Research. The reader who has examined the References will note that we have not abstracted all of the dissertations that have been done on Information Mapping's method. There are several reasons for this. There are some duplicate findings. For example: Cheung (1980), Fields (1982), Reid (1984), Mcclung (1985), and Olivares-Guerrero (1985) simply confirm and add further support to a positive answer to the question (in Chapter 1) of "Does It Work?" and to the question of how it works on difficult subject matters. Skelly (1982) does not focus on the type of research questions we discuss in this chapter. Rather, he uses Information Mapping's approach as a baseline for several treatments of advance organizers. Tanenbaum (1988) similarly focuses on the question of inserting postquestions and the giving of feedback while using Information Mapping's approach as the baseline for different treatments. Hauck (1985) focused on possible differences between left-brain, right-brain, and integrated learning styles.

58. Jonassen and Falk: Provides Significantly Better Retrieval. Another study by Falk (1981) did not reproduce these results. For analysis, see Horn, 1991, in which I analyzed the Law of Getting No Effect (and, hence, making no significant difference) with respect to information retrieval, namely, anybody can retrieve anything from a small enough document, given an unlimited amount of time.

acknowledgements

I would like to thank all of those researchers who have devoted so much time and effort to the investigation of Information Mapping's method. And I'd like to thank all of those dissertation supervisors who worked with their graduate students to accomplish this splendid research.

I would also like to especially thank Carl Binder, Dale Brandenburg, Don Cook, Doug Gorman, Steve Gussie, John Kelly, and Irwin Mesch for their comments on early drafts of this monograph. Cook and Binder were especially penetrating in their remarks and caused major changes in my thinking. The responsibility for the final work and any mistakes in it is, of course, mine.

Thanks also to Gail Sheehan for typing the early draft and to the outstanding production staff at Information Mapping, Inc. for doing the endless revisions, and thanks to Parvati Bergamo, Noel Black, and Ming Kendall for their exceptional editing and proofreading.

Robert E. Horn
April 1991

references

- Baker, E. I. (1988) *Effects of Variations in Text Designs and Reading Competency on the Immediate Recall and Application by Army Lieutenants Attending the Signal Officer Basic Course*. Ed.D. dissertation, University of Georgia.
- Bixler, Sara. *Using Structured Writing for Writing Management Reports*. Speech presented at the National Convention of the National Society for Performance and Instruction, Washington, D. C., April 1979.
- Burrell, L. O. (1978) *Effectiveness of Self-assessment Guides as a Method of Teaching Critical Care Nursing to Professional Students*. Ph.D. dissertation, University of Georgia, 1978.
- Cheung, Raymond Yuk-Ming. (1980) *Development of and Information Mapped Text on "Basic"*. M.A. thesis, Concordia University, Montreal, Canada.
- Falk, L. M. (1980) *Retrieval of Information from Self Study Texts*. Ph.D. dissertation, Temple University.
- Fields, Alan. (1981) *A Test of an Information-mapped Programmed Text*. National Society for Performance and Instruction, May 26–28.
- Fields, Alan. (1982) *An Empirical and Conceptual Investigation of Information Mapping® Techniques*. Ph.D. dissertation, the Open University (U. K.).
- Fields, Alan. (1983) *Information Mapping: An Overall Appraisal*. Programmed Learning and Educational Technology 18(3): 276–282.
- Fields, Alan. (1983) *Information Mapping Ten Years On: A Survey*. Programmed Learning and Educational Technology 18(3): 155–161.
- Hartley, J., and Trueman, M. (1983) The Effects of Headings in Text on Recall, Search, and Retrieval. *British Journal of Educational Psychology* 53:205–21.
- Hauck, L. S. *Differences in Information Mapping® Strategies in Left and Right Brain Learners*. (1985). Ed.D. dissertation, Pennsylvania State University.
- Horn, R. E. (1966) A Terminal Behavior Locator System, *Programmed Learning* (U.K.), Feb. 1966.
- Horn, R. E. (1985a) *Recent Perspectives on the Information Mapping Method*. Waltham, MA. Information Mapping, Inc.
- Horn, R. E. (1985b) Results with Structured Writing Using the Information Mapping Writing Service Standards, an invitational presentation at Designing Usable Text, a conference sponsored by the Open University, Nov. 3–7, 1980. *Toward More Usable Text: an Applied Research Perspective*. Duffy, T. M. and Waller, R. Academic Press, 1985.
- Horn, R. E. (1987a) *The Engineering of Documentation: The Information Mapping Approach*. Waltham, MA. Information Mapping, Inc.
- Horn, R. E. (1987b) *Twelve Myths that Lead to Poor Documentation*. Waltham, MA. Information Mapping, Inc.
- Horn, R. E. (1989) *Mapping Hypertext: Analysis, Linkage, and Display of Knowledge for the Next Generation of On-Line Text and Graphics*. The Lexington Institute. Available from Information Mapping, Inc.
- Horn, R. E. (1992a) Clarifying Two Controversies about Information Mapping's Method. *Educational and Training Technology International* 29(2): 109–17.
- Horn, R. E. (1992b) How to Get Little or No Effect and Make No Significant Difference. *Performance and Instruction* 31(January): 29–32.
- Horn, R. E. (1993) Structured Writing at Twenty-five. *Performance and Instruction* 32(February): 11–17.
- Horn, R. E., Nicol, E., Kleinman, J., and Grace, M. (1969) *Information Mapping for Learning and Reference*. Cambridge, I.R.I. (A.F. Systems Command Report ESD-TR-69-296).
- Horn, R. E., Nicol, E., Roman, R., et.al. (1971) *Information Mapping for Computer-Learning and Reference*. Cambridge, I.R.I. (A.F. Systems Command Report ESD-TR-71-165).

- Jonassen, D. H. (1979) *Recall and Retrieval from Mapped and Programmed Text*. Paper presented at AECT Convention, New Orleans, LA, Feb. 1979. (ERIC Document Reproduction Service No. Ed 249 940).
- Jonassen, D. H. and Falk, L. M. (1980) Mapping and Programming Textual Materials, *Programmed Learning and Educational Technology*. 17, no.1(Feb.): 20–26.
- Jonassen, D. H. (1981) Information Mapping: A Description, Rationale and Comparison with Programmed Instruction, *Visible Language* 15(1): 55–66.
- Jonassen, D. H. and Pace, A. J. (1983) *Comparison of the Effects of Different Forms of Presentation on the Recall and Retrieval of Information*. Paper presented at the annual meeting of the American Educational Research Association, New York, N. Y. (ERIC Document Reproduction Service No Ed 214 148).
- Jonassen, D. H. (1983) *Blocking and Types of Headings in Text: Effects on Recall and Retrieval*. Paper presented at the 67th Annual Meeting of the American Educational Research Association, Montreal, Canada (ERIC Document Reproduction Service No. Ed 228 313).
- Mcclung, L. G. (1985) *The Church Growth/Church Planning Study Guide: A Two-phase Reading and Self-study Course*. D.Miss. dissertation, Fuller Theological Seminary.
- Olivares-Guerrero, R. A. (1985) *Manual for the Evaluation of the Teacher Education Programs in Chile*. Ed.D. dissertation, Columbia University Teachers College.
- Reid, U. V. (1984) *Instructional Systems Development: A New Approach to Education Planning in the Health Systems of the Commonwealth Caribbean*. Ed.D. dissertation, Columbia University Teachers College.
- Reid, U. V., and Wright, P. (1973) Written Information: Some Alternatives to Prose for Expressing the Outcomes of Complex Contingencies. *Journal of Applied Psychology* 57(2): 160–66.
- Romiszowski, A.J. (1977) *A Study of Individualized Systems for Mathematics Instruction at the Post Secondary Levels*. Ph.D. dissertation. Loughborough University of Technology (U.K.).
- Ross, B. (1987) Reference-Based Training, *End-User Computing* (December): 7–8.
- Schaffer, E. M. (1982) The Potential Benefits of the Information Mapping Technique, *NSPI Journal* (February): 34–38.
- Skelly, W. H. (1982) *The Effects of a Comparative Advance Organizer on Knowledge Acquisition and Retention and Its Interaction with Ninth-Grade Male and Female Students of Differing Academic Abilities in a Unit Utilizing the Information Mapping® Approach to Instructional Design*. Ed.D. dissertation, Temple University.
- Soyster, Thomas G. (1980) *A Comparison of the Effects of Programmed Instruction and the Information Mapping® Method of Instructional Design on Learning and Retention of Students with Different Mental Abilities*. Ed.D. dissertation, Temple University.
- Stelnicki, Michael. (1980) *The Effects of Information-mapped and Standard Text Presentations with Fact and Concept Levels of Learning on Low General Ability Adult Learner Cognition*. Ed.D. dissertation, Northern Illinois University.
- Tanenbaum, B. G. (1988) *Effects of Inserted Postquestions and Feedback on Student Recall of Material in an Information Mapped Nutrition Text Developed for Associate Degree Nursing Students*. Ed.D dissertation, University of Georgia.
- Wason, P. C. (1959) The Processing of Positive and Negative Information. *Quarterly Journal of Experimental Psychology* 2:92–107.
- Wason, P. C. (1960) On the Failure to Eliminate Hypotheses in a Conceptual Task. *Quarterly Journal of Experimental Psychology* 3:128–40.
- Wason, P. C. (1962) *Psychological Effects of Negation*. London: Communication Research Center.
- Wason, P. C. (1965) The Contexts of Plausible Denial. *Journal of Verbal Learning and Verbal Behavior* 1:7–11.
- Wason, P. C., and Jones, S. (1963) Negatives: Denotation and Connotation. *British Journal of Psychology* 4: 299–307.
- Webber, N. (1979) *Some Results of Using the Information Mapping Writing Service Standards at Pacific Telephone Co*. Paper presented at NSPI Conference, Washington, D.C., 1979.

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